

UNITED STATES DISTRICT COURT
DISTRICT OF NEW JERSEY

Robert McGee, et al.,	.	Docket #08-CV-520 (MLC)
	.	
Plaintiffs,	.	
	.	United States Courthouse
vs.	.	Trenton, New Jersey
	.	July 9, 2012
Stihl Incorporated, et al.,	.	9:44 a.m.
	.	
Defendants.	.	

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TRANSCRIPT OF DAUBERT HEARING
BEFORE THE HONORABLE MARY L. COOPER
UNITED STATES DISTRICT COURT JUDGE

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1 THE COURT: Good morning counsel.

2 ALL: Good morning.

3 THE COURT: I'll have your appearances in the McGee
4 case.

5 MR. PACKIN: Thank you, Your Honor. Good morning.
6 Barry Packin from the law firm of Nagel Rice, representing the
7 Plaintiffs, McGee.

8 MR. WALSH: Jim Walsh from the law firm of McGuire
9 Woods, representing Stihl.

10 MR. RUDOLPH: Good morning, Your Honor, Steve
11 Rudolph, Rudolph & Kayal on behalf of the Stihl Defendants.

12 THE COURT: Fine. And we have Doctor Hayes this
13 morning, right?

14 MR. PACKIN: Yes, Ma'am.

15 THE COURT: Okay, you can call the witness and give
16 me a moment to just set up my files.

17 MR. PACKIN: I would call to the witness stand
18 Wilson C. Hayes, PhD.

19 WILSON CARLYLE HAYES, PLAINTIFFS' WITNESS, SWORN

20 THE CLERK: Please state and spell your full name
21 for the record.

22 DR. HAYES: It is Wilson, W-I-L-S-O-N, Carlyle, C-A-
23 R-L-Y-L-E, last name is Hayes, H-A-Y-E-S, and that's PhD.

24 THE COURT: I'll tell you when I'm ready.

25 MR. PACKIN: Yes, Ma'am.

1 (Pause in proceedings)

2 THE COURT: One moment, please. Proceed, Counsel.

3 MR. PACKIN: Thank you, Your Honor. Your Honor,
4 just for the record, we pre-marked as Plaintiffs' Exhibit-1
5 Dr. Hayes' curriculum vitae. As Plaintiffs' Exhibit-2, his
6 testimony disclosure. As 3 --

7 (Plaintiff's Exhibit-1 previously marked for
8 identification)

9 (Plaintiff's Exhibit-2 previously marked for
10 identification)

11 THE COURT: Just a minute. What do you mean his
12 testimony disclosure?

13 MR. PACKIN: The Rule 26 list of testimony that he's
14 given.

15 THE COURT: You call that a testimony disclosure?
16 Okay, fine.

17 MR. PACKIN: His --

18 THE COURT: Just a second, please, counsel. Go
19 ahead.

20 MR. PACKIN: As P-3, his report of November 3, 2009.
21 As P-4 his report of January 15, 2010.

22 (Plaintiff's Exhibit-3 previously marked for
23 identification)

24 (Plaintiff's Exhibit-4 previously marked for
25 identification)

1 THE COURT: 15, 2010.

2 MR. PACKIN: As P-5, the packet of color photographs
3 taken at the accident scene.

4 (Plaintiff's Exhibit-5 previously marked for
5 identification)

6 THE COURT: How many in number, do you know?

7 MR. PACKIN: I believe it's 35, but let me double
8 check.

9 THE COURT: Approximately. I'll leave it at that
10 for the moment. Just so we move along.

11 MR. PACKIN: I believe it's 35.

12 THE COURT: Okay.

13 MR. PACKIN: And P-6, a packet of color photographs
14 of the injuries to Mr. McGee's face and neck, and I believe
15 those are 11 in number.

16 (Plaintiff's Exhibit-6 previously marked for
17 identification)

18 THE COURT: Okay. Those are the pre-marked
19 exhibits?

20 MR. PACKIN: Yes, Ma'am.

21 THE COURT: In evidence by consent?

22 MR. WALSH: Yes, Ma'am.

23 THE COURT: So noted. Thank you.

24 (Plaintiff's Exhibit-1 admitted into evidence)

25 (Plaintiff's Exhibit-2 admitted into evidence)

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1 (Plaintiff's Exhibit-3 admitted into evidence)

2 (Plaintiff's Exhibit-4 admitted into evidence)

3 (Plaintiff's Exhibit-5 admitted into evidence)

4 (Plaintiff's Exhibit-6 admitted into evidence)

5 THE COURT: I'll tell you when I'm ready.

6 (Pause in proceedings)

7 THE COURT: I'm not ready yet. The set you gave me
8 is here, but it's not marked, so I'm just going to make pencil
9 marks for the bench copy. Go right ahead.

10 MR. PACKIN: Thank you. Does Your Honor prefer if I
11 examine from the table or the podium, or --

12 THE COURT: It makes no difference to me.

13 MR. PACKIN: Thank you.

14 DIRECT EXAMINATION

15 BY MR. PACKIN:

16 Q. Good morning, Dr. Hayes.

17 A. Good morning.

18 Q. On the curriculum vitae that we have marked as Plaintiff's
19 Exhibit-1, is that a current and accurate copy of your
20 curriculum vitae?

21 A. Yes.

22 Q. What are your areas of specialty, Dr. Hayes?

23 A. I specialize most fundamentally and broadly in a field
24 called injury biomechanics. I'm also a mechanical engineer.
25 I also have a Master's in Mechanical Engineering Design. And

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1 in support of my activities in injury biomechanics, I do what
2 is sometimes referred to as accident reconstruction, but also
3 event reconstruction or incident reconstruction.

4 THE COURT: All the same thing? Those three terms?

5 A. They are used interchangeably. Accident reconstruction
6 has come to be associated with motor vehicle accidents and
7 thus, I think it's better to use the event reconstruction or
8 incident reconstruction.

9 BY MR. PACKIN:

10 Q. Dr. Hayes, could you define for us what is meant by injury
11 biomechanics?

12 A. Yes, let me take the two terms. Injury is our common
13 sense of the word. We're hit with something in the head, we
14 have a concussion or --

15 THE COURT: Counsel, would you please instruct Dr.
16 Hayes that my custom is to testify into the room, not to the
17 bench.

18 MR. PACKIN: Okay.

19 A. Thank you, Your Honor.

20 THE COURT: Sure.

21 A. You fracture a skull. You have a concussion. You fall
22 and break your hip. Any of those changes to the anatomy where
23 pain occurs and is not normally there or the anatomic site no
24 longer functions appropriately, are common sense of an injury.
25 It works just fine. Biomechanics is the combination of two

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1 terms: Biology and mechanics. In a setting such as this,
2 we're really talking about the biology and anatomy related to
3 the musculoskeletal system, and since mechanics is the study
4 of the effects of forces on objects, really what we're about
5 in injury biomechanics is looking at how forces and motions of
6 objects can cause injury to the human body and to the
7 musculoskeletal system.

8 BY MR. PACKIN:

9 Q. Does injury biomechanics involve in any way engineering
10 principles?

11 A. It absolutely does. Since mechanical engineering involves
12 forces on objects --

13 THE COURT: Mechanical what?

14 A. Engineering. Involves forces on objects, how people fall,
15 how they position themselves, how they balance themselves, is
16 a direct application of mechanical engineering. If something
17 breaks, just if I were to take a yardstick and bend it until
18 it broke, that's mechanical engineering on an engineered
19 object. The same applies to a fracture of a bone -- long bone
20 of the body or fractures to the mandible and other parts of
21 the face and neck.

22 BY MR. PACKIN:

23 Q. How, if at all, is accident reconstruction different from
24 injury biomechanics?

25 A. I have mentioned already the use of accident

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1 reconstruction associated with motor vehicle collisions.

2 We're not doing that here, of course. Injury reconstruction

3 or injury biomechanics is the step after you first understand

4 how the incident occurs. So, how is someone positioned? How

5 do we have from scene --

6 THE COURT: Just a second. I lost you there. I'll

7 be right with you. Accident reconstruction refers these days

8 to motor vehicle, right?

9 A. Yes.

10 THE COURT: And incident reconstruction -- you were

11 explaining some distinction between the term incident

12 reconstruction and the term injury biomechanics. Something

13 about how you know that the -- you know basically how the

14 accident occurred, but something else -- you're going to be

15 trying to determine. I didn't follow that.

16 A. Okay. So the first step is we have to reconstruct the

17 event. If it's an --

18 THE COURT: So that's incident reconstruction?

19 A. That is fine to call incident or event reconstruction.

20 How is a person positioned? What is the environment around

21 that person? The second part of the process one has to, in a

22 sense, connect that environment and the mechanics of, in this

23 case, a moving saw and saw blade.

24 THE COURT: Mechanics of moving objects? Is that

25 right?

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1 A. Moving objects or in this instance, a rotating saw blade
2 and a saw. And connect it to the injuries that are actually
3 observed. And I think an effective way to look at it is to
4 think of the injuries as a kind of signature to the event that
5 allow you to work back from the objective evidence of injury
6 to what caused it and how it occurred.

7 THE COURT: Allow you to work back to the events of
8 the injury to determine how it occurred -- of the incident --
9 to determine how the injuries occurred?

10 A. Yes. And in this instance, we have a rather unique
11 situation where we have a --

12 THE COURT: Just a second. Let's get another
13 question.

14 BY MR. PACKIN:

15 Q. And how does that apply -- the injury biomechanics and
16 accident reconstruction in this particular case?

17 A. In this instance, we have a rather unique situation where
18 we have direct evidence on the scene of where the saw was at
19 the time that this incident initiated, and then we have direct
20 evidence on the face and neck of Mr. McGee as to how the saw
21 moved when it hit him.

22 MR. WALSH: Your Honor, I'm going to object. I
23 think we are well outside the report of this witness. The
24 witness gave a report on three specific questions. He was --
25 during his deposition, Mr. Packin made very clear he was not

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1 being offered on anything except those three questions, and
2 none of this has anything to do with those three questions.

3 MR. PACKIN: It most certainly does, Your Honor.

4 THE COURT: Okay, it does. Objection overruled.

5 MR. PACKIN: Thank you.

6 THE COURT: One moment, please, though. I'll be
7 right back. I just forgot something.

8 (Pause in proceedings)

9 THE COURT: All set.

10 BY MR. PACKIN:

11 Q. Dr. Hayes, you were explaining about the injuries being
12 the signature to the event.

13 A. Yes, and so we have evidence from photographs --

14 THE COURT: Just a second, please. Let me see
15 counsel at the side. I just want to see what the order of the
16 direct is so that I can follow the plan.

17 (Sidebar on the record - began at 9:58 a.m. and ended at
18 9:58 a.m., transcribed under separate cover)

19 THE COURT: I don't need to direct you, counsel,
20 able, experienced, counsel, what to do, but if you're going to
21 go over any of Dr. Hayes's background and qualifications, I'll
22 hear about that now. I'm fully familiar with the materials
23 that have been submitted on this motion, including his
24 original report, his supplemental report, and his deposition
25 in this case. I have not taken it upon myself to read his

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1 depositions in the Stout case. Some of the photographs, I
2 don't think, were necessarily available to me, but -- in the
3 motion papers, but they're here in hearing evidence. So, if
4 you just progress through in summary the qualifications if you
5 wish to bring that out, and then we'll talk about this case.
6 But the terms of our -- I think for the jury that would be
7 helpful. I don't have much need to be informed about that.

8 MR. PACKIN: Thank you.

9 BY MR. PACKIN:

10 Q. Dr. Hayes, what is your educational background?

11 A. I was a mechanical engineering student at Stanford
12 University from 1960 to 1964, graduating with a Bachelor's in
13 Mechanical Engineering '64. I then took a Master's Degree in
14 Mechanical Engineering, also from Stanford University, in a
15 special program in Mechanical Engineering Design. During that
16 program, I started working with people in the medical school,
17 decided I wished to go on in that field, and took a PhD in a
18 field that is essentially mechanical engineering at
19 Northwestern University, but it was a combined program between
20 both the Engineering School and the Medical School, and so I
21 took the basic science years of medical school; anatomy,
22 physiology, neurophysiology, along with medical students. I
23 graduated from that program in 1970, did a PhD dissertation on
24 the effects of impact forces on cartilage, the lining surfaces
25 of our joints.

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1 Q. And were you awarded your doctoral degree, sir?

2 A. Yes. 1970.

3 Q. And from what institution?

4 A. From Northwestern University.

5 Q. Did your studies leading to your Bachelor's and Master's
6 Degrees in Mechanical Engineering at Stanford provide you with
7 any knowledge or education relevant to injury biomechanics?

8 A. It did. I started at the very first week studying a
9 course called Strength of Materials, which is a fundamental
10 tenet of how strong materials are, both in the body and
11 elsewhere. I studied the effects of forces on objects and how
12 objects move. And so, I had the basic understanding of
13 virtually all of what I do today in engineering physics as
14 part of my undergraduate degree in ME.

15 Q. And your PhD in Theoretical and Applied Mechanics, did
16 that provide you with any knowledge or education relevant to
17 injury biomechanics?

18 THE COURT: Just a second. In 1966, when you got
19 your MS in Mechanical Engineering, and in 1970, when you got
20 your PhD in Theoretical and Applied Mechanics, was the term
21 biomechanics in common usage in scientific circles?

22 A. It was just starting -- well, the term biomechanics
23 broadly was used for some decades before that. Its
24 application in orthopedics and injuries to the musculoskeletal
25 system was an emerging field at that point in time.

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1 THE COURT: Okay. So the -- you're saying the
2 emphasis in -- the degrees in Mechanical Engineering and
3 Theoretical and Applied Mechanics, the way that you took them,
4 did involve the human body as an important focus of what you
5 studied?

6 A. I went to medical school, basically, without an intent to
7 become a physician, in order to learn the anatomy and
8 physiology.

9 THE COURT: Go on, counsel.

10 MR. PACKIN: Thank you.

11 BY MR. PACKIN:

12 Q. Did you have any post-doctoral training or education?

13 A. I did. I spent one year at the Laboratory for
14 Experimental Surgery in Davos, D-A-V-O-S, Switzerland,
15 studying the mechanics of fracture healing and treatment. I
16 spent a second post-doctoral year at the Department of
17 Orthopedic Surgery in the Main Orthopedic Hospital in
18 Stockholm, Sweden, where I returned to the subject matter of
19 my dissertation; the effects of impact forces on cartilage.

20 Q. Did the research fellowship in the Laboratory for
21 Experimental Surgery provide you with any knowledge,
22 education, or training relevant to injury biomechanics?

23 A. It did. It allowed me to -- as a non-physician, non-
24 surgeon, to participate in live animal surgeries that were
25 under way in that institution, which was a valuable supplement

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1 to my subsequent teaching responsibilities at Harvard, in
2 particular, teaching human anatomy, which was necessarily done
3 from human cadaver work.

4 Q. Your training in the Department of Orthopedic Surgery in
5 Sweden, that was through the National Institutes of Health, is
6 that correct?

7 A. It was N-I-H, National Institutes of Health, Special
8 Fellowship, was the last year that they offered such
9 fellowships to go overseas.

10 Q. And did that fellowship training provide you with any
11 knowledge, education, or training relevant to the area of
12 injury biomechanics?

13 A. It did. I was required as part of that fellowship to
14 attend x-ray conferences every single day, along with
15 orthopedic surgeons, and my role there was really both to
16 learn their surgical procedures and required input as well as
17 to provide input on the biomechanics of the injury as well as
18 the mechanics of treatments that they were considering. And I
19 subsequently did that same kind of x-ray round for the rest of
20 my academic career.

21 Q. Have you held any faculty appointments?

22 A. I have. When I first returned from Europe, I took a
23 position as an Assistant Professor of -- again, the department
24 was called Theoretical and Applied Mechanics, a local name for
25 mechanical engineering. I was an Assistant Professor in that

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1 department as well as an assistant professor in the Division
2 of Orthopedic Surgery at Stanford Medical School. I was in
3 that role from '71 to '76. In 1976, I moved to the University
4 of Pennsylvania where my primary appointment was in the
5 Department of Orthopedic Surgery. My secondary appointment
6 was in the College of Engineering in the Bioengineering
7 Department.

8 THE COURT: I think that was 1971?

9 A. '71 was --

10 THE COURT: Look at your own CV.

11 A. '71 was when I went to -- when I taught at Stanford -- '71
12 to '76.

13 THE COURT: Would you look at your on CV, please?
14 Which is fine, you can consult your own CV.

15 A. Well, if it says '67 to -- these dates have all been --
16 oh, I can see what happened, Your Honor. If you move the
17 dates -- the top date that says Faculty Appointments and go
18 across, that's displaced upward, and if we move them down one,
19 we get the correct dates, and my apology. I didn't notice
20 that.

21 THE COURT: Down one -- move down one. Move down
22 one line. Thank you. That clears that up.

23 A. My apologies.

24 THE COURT: Go right ahead.

25 BY MR. PACKIN:

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1 Q. Continue, Dr., regarding the faculty appointments that you
2 held.

3 A. So it's -- in 1976 to 1979, I was at the University of
4 Pennsylvania, again with a joint appointment in Engineering
5 and Medicine. And then in 1979, I was offered a position at
6 Harvard Medical School, and at the Beth Israel Hospital. I
7 took that position in 1979 and was there at Harvard from 1979
8 to '98. I was First Associate Professor of Orthopedic
9 Surgery, appointed a full Professor, I think, '85, and then to
10 an Endowed Chair in Orthopedic Surgery at Harvard in 1987. I
11 was also made a member of the Faculty of the MIT Health
12 Sciences and Technology Program, and those academic
13 appointments also applied at MIT and was in that role from '83
14 to '98. In 19 --

15 THE COURT: It says here that you were the Maurice
16 Edmond Muller Professor of Biomechanics at Harvard Medical
17 School.

18 A. That's correct, Your Honor.

19 THE COURT: And -- are you saying that that
20 appointment was in about 1987?

21 A. That appointment was 1987, yes.

22 BY MR. PACKIN:

23 Q. Is that the Endowed Chair that you were referring to?

24 A. That was the Endowed Chair, yes.

25 THE COURT: Okay, so that was Chair in Biomechanics.

Hayes - Direct

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1 By now it's called biomechanics?

2 A. Yes.

3 THE COURT: Okay. Thank you.

4 BY MR. PACKIN:

5 Q. Did those -- have you finished with your faculty
6 appointments?

7 A. And then I moved in 1998 to Oregon State University where
8 my administrative appointment was as Vice Provost of Research
9 for the entire university. I had an appointment at the
10 Medical School in Portland; Oregon Health Sciences University
11 in the Department of Orthopedics, and I also had an
12 appointment in Health and Human Sciences in the Engineering
13 School at Oregon State.

14 BY MR. PACKIN:

15 Q. How did --

16 THE COURT: And Nutrition, it looks like. And
17 Exercise.

18 A. That is now what -- that's the department as opposed to
19 the college.

20 BY MR. PACKIN:

21 Q. Okay. As part of holding those faculty appointments, did
22 you have any teaching responsibilities?

23 A. I did. I taught --

24 Q. What did you teach?

25 A. Excuse me, counsel. I taught Undergraduate Engineering

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1 courses, mainline engineering Undergraduate and Graduate
2 courses. I taught biomechanics from an engineering
3 perspective in the Engineering School.

4 Q. At what university?

5 A. At Stanford. And I also taught Orthopedic biomechanics at
6 the School of Medicine at Stanford. I taught the same course
7 that I had taught earlier as a graduate student when I was at
8 Northwestern University in the '60s. A similar situation at
9 the University of Pennsylvania. When I got to Harvard, my
10 teaching responsibilities changed in a sense, and I was asked
11 to be one of the three core faculty members of a course called
12 Human Functional Anatomy, which was the intense form of the
13 anatomy course at Harvard that was used for both MD and PhD
14 students interested in working in these combined fields.

15 THE COURT: Let me ask a really simple question.
16 Why do doctors want to know what the mechanical forces were
17 that produced the injuries that the doctors are coping with in
18 the patients?

19 A. A couple of examples.

20 THE COURT: I mean, because you're teaching this to
21 medical students?

22 A. I am. Here's a straightforward example. You've heard of
23 total hip replacements, of course? If you lift your leg off
24 the bed by yourself after you've had a total hip replacement,
25 the forces across your hip are greater than the forces when

Hayes - Direct

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1 you get out of bed and walk. And understanding that and
2 teaching physicians such that they realize that they're
3 putting huge forces on the body when they do it that way, is
4 one kind of interesting, crucial treatment. Second, if you
5 look at an x-ray and it's a very simple fracture, let's say of
6 the femur, and then you look at a second x-ray where the
7 fracture is broken up into small pieces. The term is called
8 comminuted. That tells me that much more energy was
9 associated with the second fracture and is likely to cause
10 more soft tissue and vascular damage. Thirdly, last example,
11 we're all told that grandma breaks her hip because she has
12 osteoporosis and doesn't take her osteoporosis drugs, doesn't
13 drink milk, you know, the milk ads, etc. It turns out that
14 grandma breaks her hip far more because of the way she falls
15 and impacts the ground than anything to do with osteoporosis,
16 and if my academic and research contributions have made a
17 contribution, it's in the understanding that falls are a
18 determining factor in hip fractures more than the sense of
19 osteoporosis. If you fall and land on your nose, you don't
20 tend to break your hip. If you fall and land on your hip, you
21 almost always break your hip.

22 THE COURT: Okay. That's a helpful answer. Thank
23 you.

24 BY MR. PACKIN:

25 Q. You were speaking about your teaching responsibilities at

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1 -- I think you were up to Harvard or MIT.

2 THE COURT: I think we're through there. I mean,
3 really. I'm interested in moving along.

4 MR. PACKIN: Okay.

5 THE COURT: It's -- I just want to get this -- just
6 sort of the impression from this, I think, is all we need for
7 this hearing today.

8 MR. PACKIN: Okay.

9 MR. PACKIN: This is not full-dress testimony before
10 the jury.

11 BY MR. PACKIN:

12 Q. Since they have challenged Dr. Hayes' qualifications, I
13 wanted to go through them, but I will follow Your Honor's
14 directive.

15 THE COURT: He can have more scope to answer on
16 cross, and you may have an opportunity to come back at
17 redirect if you haven't been thorough enough. Is that
18 acceptable, Mr. Walsh?

19 MR. WALSH: It's acceptable to me, Your Honor.

20 BY MR. PACKIN:

21 Q. Let's go, Dr. Hayes -- according to your CV, you developed
22 some courses at Northwestern in Orthopedic biomechanics?
23 Could you just tell us briefly what that was about?

24 A. That was teaching --

25 THE COURT: What page is that?

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1 MR. PACKIN: That might actually have -- well, Dr.
2 Hayes can tell us what page on his CV. I think it's actually
3 taken from the Statement of Qualifications in his report.
4 There's a narrative statement of qualifications in the report.

5 THE COURT: Okay. All right.

6 MR. PACKIN: I think it's in paragraph number four.

7 THE COURT: I think we covered paragraph four.

8 MR. PACKIN: Actually, it's in five -- five.

9 THE COURT: I think you covered that, too.

10 MR. PACKIN: All right.

11 THE COURT: Did you, sir?

12 A. I did mention teaching that course at Northwestern, and I
13 think I've talked about most of the courses that I have taught
14 over the years, as long as we understand it's been in both
15 Engineering and Orthopedics and Anatomy.

16 THE COURT: Fine.

17 BY MR. PACKIN:

18 Q. You mention in your report that you taught post-graduate
19 courses in biomechanics of the musculoskeletal system to
20 orthopedists, radiologists, and neurologists at Harvard
21 Medical School. Could you tell us briefly what that teaching
22 involved?

23 A. That involved injury biomechanics as well as some of the
24 topics that we've already discussed this morning to a more
25 advanced group, relating to graduate students and full-time

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1 staff members who were interested in learning about this
2 field.

3 Q. And while you held these academic and teaching positions,
4 did you hold any research appointments?

5 A. I did. I was Director of the Laboratory for Experimental
6 Mechanics at Stanford. One relevant piece of work or activity
7 in that laboratory was a motor vehicle crash reconstruction
8 laboratory. This is in the early '70s when we were worried
9 about the effects of shoulder belts on injuries to the human
10 spine. We had a crash reconstruction laboratory including a
11 sled. We had crash dummies. We used human cadavers to look
12 at the issue of frontal collisions and whether or not you
13 would fracture your thoracic or dorsal spine when using those
14 seat belts, and thankfully we were able to contribute to the
15 knowledge base that they helped far more than they hurt.

16 Q. What was your involvement in setting up that accident
17 reconstruction crash facility?

18 A. I competed for funding to do so.

19 THE COURT: Are we at a university with this
20 facility?

21 A. We are.

22 THE COURT: Which one?

23 A. We're at Stanford University. I bought the equipment,
24 set up the laboratory, obtained the cadaver specimens,
25 designed the research, conducted the experiments, and

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1 evaluated and published them.

2 BY MR. PACKIN:

3 Q. What other research projects were you involved in while
4 you were teaching?

5 THE COURT: Well, he says he's principal or co-
6 principal investigator on 61 research grants, so you can lead
7 a little bit.

8 BY MR. PACKIN:

9 Q. Can you pick some of the research grants that you think
10 are most indicative of your eventual work in injury
11 biomechanics and accident reconstruction?

12 A. Roughly, perhaps 20% of my activities have been on injury
13 biomechanics to the spine. Another aspect of our activities
14 is in the general field of ergonomics, or the study of human
15 work and forces on the human body. I was funded for nearly 20
16 years by the National Institutes of Health to study the
17 effects of falls on hip fracture risk and the kinds of
18 mathematical models that were used in the McGee case were the
19 same sorts of -- the term is anthropometric, or anthropometry
20 -- anthropometric models that were used here to study this
21 particular case.

22 Q. On you CV, it refers, for example, to work as Head of the
23 Biomechanics Section of the Department of Orthopedic Surgery
24 at the University of Pennsylvania. What did that involve?

25 A. That involved fundamental orthopedic biomechanical

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1 research. A lot of it, since the focus of the department was
2 on cartilage, the lining surface of our joints, again, I was
3 studying whether arthritis occurs from wear or tear or other
4 genetic and biological factors, for instance. I also studied
5 the injury threshold of bone. I studied the knee joint and
6 its replacements. And these are all reflected in peer-
7 reviewed publications if you look at the time period that I
8 was there, it gives a kind of outline to the work that was
9 done.

10 Q. Your CV also lists a number of grants that you were
11 awarded covering some 2-1/2 pages or more. Just briefly, how
12 did you obtain such grants?

13 A. If one is applying to Federal agencies, for instance, like
14 the National Institutes of Health, or the Centers for Disease
15 Control, you have to write a proposal, you submit that
16 proposal for national review, and in order to be funded, you
17 have to score highly enough to be within the -- for much of my
18 career, the top 10% of all grants submitted to the National
19 Institutes of Health. If you get the money, you can then
20 proceed to do the research. So it is a competitive, and
21 sometimes highly competitive process.

22 Q. Does your CV reflect accurately the various grants you've
23 received over the years?

24 A. It does.

25 Q. One of the grants, and I believe you briefly mentioned it,

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1 was Fall Biomechanics and Hip Fracture Risk. When was that
2 done in point in time?

3 THE COURT: Which one is this?

4 MR. PACKIN: Fall Biomechanics and Hip Fracture
5 Risk.

6 THE COURT: And can you find that on the CV?

7 A. I can, Your Honor. If you go to page six, and about three
8 or four lines down from the top, it says "National Institutes
9 of Health, Fall Biomechanics and Hip Fracture Risk." And the
10 dates given are 1990-2007.

11 THE COURT: Okay. And what's the question, Mr.
12 Packin?

13 BY MR. PACKIN:

14 Q. In terms of that particular grant, was that, as it appears
15 by the title, to have been a biomechanical study?

16 A. It was injury biomechanics in all of its applications.
17 How did these fractures occur? What are the forces associated
18 with these fractures? Do people fracture their hips because
19 they fall, or for some other reason?

20 Q. And --

21 THE COURT: Can I just ask another simple question?

22 MR. PACKIN: Absolutely.

23 THE COURT: Sometimes, just out of curiosity I ask.

24 MR. PACKIN: Absolutely.

25 THE COURT: This is irrelevant. When grandma falls

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1 on the kitchen floor, breaks the hip, do you find that
2 sometimes it was because the hip disintegrated and caused her
3 to fall?

4 A. Short answer, Your Honor. Yes, but in a very small
5 percentage of cases. Something less than 10%. People will
6 report I was just walking along, my hip broke, and I fell
7 down. That's certainly not the dominant mode.

8 THE COURT: Okay, thank you.

9 BY MR. PACKIN:

10 Q. In terms of that particular study, what type -- did you
11 use any form of mathematical or computer model?

12 A. We did constantly, both the fundamental laws of physics,
13 meaning what sort of velocities does the body achieve as it
14 hits the ground and what forces does that impart or impose on
15 the hip? We did testing in the laboratory or human hips in
16 all sorts of loading configurations -- used cadaver material,
17 broke the hips, and then compared the forces that are
18 associated with a fall and impact on the ground to the
19 strength of the hip. Anthropometry, which is the study of
20 human size and shape --

21 THE COURT: Let me just get that, please, in my
22 notes, because I saw that term in your report. A-N-T-H-R-O-P-
23 O-M-E-T-R-Y is the study of human size and shape? Yes?

24 A. Yes.

25 THE COURT: Period?

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1 A. Yes.

2 THE COURT: Okay, go ahead.

3 A. It turns out anthropometry is crucial to that particular
4 research question, as it is to the questions of this case in
5 that if you have a lot of padding over your hip, that tends to
6 act, if you want to think of it as a pillow, that absorbs
7 energy and prevents forces going through to the hip and the
8 causing fracture. So, understanding people's size and shape
9 and distribution of body fat was a crucial part of that entire
10 research study.

11 BY MR. PACKIN:

12 Q. Now, have you been honored, in your career, for any of
13 your research activities?

14 A. Yes. And I was hasten to say that these honors are the
15 consequence of collaborative efforts with students and faculty
16 members. I was awarded the Kappa Delta Award, which is the
17 highest research honor, I suppose, of the American Academy of
18 Orthopedic Surgeons. I think that was around 1987. In 1995
19 or so, I was honored --

20 THE COURT: This is from orthopedic surgeons?

21 A. This is from the American Academy of Orthopedic Surgeons.

22 THE COURT: Where is that on the CV?

23 MR. PACKIN: Page 2, Your Honor.

24 A. There is a section called "Honors and" --

25 THE COURT: Sure.

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1 A. It's about the fifth or sixth one down.

2 THE COURT: Yes, okay. Kappa Delta? Is that what
3 it is?

4 A. Yes.

5 THE COURT: Okay.

6 A. Shall I continue?

7 BY MR. PACKIN:

8 Q. Yes.

9 A. And then, in 1995, I was awarded from the American Society
10 of Biomechanics the so-called Giovanni Borelli Award, and that
11 was for our work on falling and hip fractures. The one after
12 that is a grant -- sorry, an award to our research laboratory
13 for Excellence in Research in Orthopedic Treatment that had to
14 do with understanding injuries, joint replacement, and
15 arthritic changes in the human knee.

16 Q. In your professional activities, have you played any role
17 in setting any national research agenda in orthopedics?

18 A. Yes, I have been asked to serve on, and in some instances,
19 direct subcommittees of the National Institutes of Health.
20 This is back in the early '90s, setting the research agenda in
21 orthopedics and orthopedic biomechanics for the next decade.
22 I did that for the National Institutes of Health, for the
23 Centers --

24 THE COURT: So this is standard setting?

25 A. No, this is not standards setting. This is trying to map

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1 out the directions research should take such that the National
2 Institutes of Health could release invitations to researchers
3 around the country as to what were important research
4 directions to pursue. So I did that for the Centers for
5 Disease Control, mostly about injury issues. I chaired a
6 workshop for --

7 THE COURT: Why does the Centers for Disease Control
8 in Atlanta care about injury issues?

9 A. Hip fracture is a multi-billion dollar, both scientific
10 and financial impact. People with hip fractures are filling
11 more than 50% of orthopedics beds, and if hip fractures
12 continue to rise, it's fairly clear that we may not have
13 orthopedic beds for any other reason than hip fracture
14 patients, so it's a huge national problem.

15 THE COURT: So hip fracture is considered disease?
16 Fractures are considered disease in your framework?

17 A. I would say just the opposite. They are in part a
18 consequence of the loss of bone --

19 THE COURT: No, I'm just saying, the Centers for
20 Disease Control has a broader scope than just infections and
21 that kind of thing?

22 A. It does. Very much so.

23 THE COURT: So hip fractures fall under its
24 umbrella?

25 A. Yes, absolutely.

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1 THE COURT: Okay.

2 A. And particularly if you realize that this -- it's called
3 the Centers for Disease Control and Prevention.

4 THE COURT: Yes.

5 A. And so, injury prevention was a big part of their mandate
6 when I was working with and for them.

7 BY MR. PACKIN:

8 Q. Have you held any hospital or clinical appointments?

9 A. I have. In each of these situations, I was, in fact, had
10 a clinical appointment in the Department or Division of
11 Orthopedic Surgery where my responsibilities involved
12 attending x-ray rounds and providing the kind of input that I
13 have already talked about, and I did that for over 40 years.

14 THE COURT: I can see that on page 2, the list of
15 medical school and hospital appointments. I'm trying -- I've
16 never heard of this before. I'm trying to picture how,
17 basically a PhD engineer type integrates with the doctors in
18 the clinical setting. What do they do with you? I mean, how
19 do they deal with you when you're there?

20 A. Every single --

21 THE COURT: I don't mean socially, of course. I
22 mean professionally.

23 A. Every single morning, orthopedic surgeons put up their
24 patient x-rays for the surgeries they're doing that day. They
25 would go through those x-rays, talk about the patient. I

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1 would be asked, while looking at the x-rays, to interpret how
2 that particular injury is likely to have occurred and what
3 kind of consequences they could expect from that injury --

4 THE COURT: When they get in there?

5 A. When they get -- absolutely when they get in there.

6 THE COURT: Okay.

7 A. Or, as another example, let's say you have a fracture of
8 the main long bone of your leg, your femur. Lots of
9 biomechanical work had been done on the relative advantages of
10 metal plates on the outside of the bone; what's called a
11 medullary rod down the shaft of the bone, and I would get
12 asked questions like, well, what's the biomechanical research
13 say in terms -- I have a noncompliant patient who's going to
14 go out and run around no matter what I do. What's the best I
15 can do? And they would ask questions like, from your
16 engineering perspective, what's the best surface of that bone
17 to put that plate on? So it was a fascinating opportunity
18 both to learn and to provide input to patient care without
19 putting my hands on the patient.

20 BY MR. PACKIN:

21 Q. Dr. Hayes, your CV consists of -- well, let me go forward
22 for a second. You've talked a lot about medicine along the
23 lines of what the Judge just asked you. You're not a
24 physician, is that correct?

25 A. I am not a physician. I am not licensed in any state. I

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1 don't treat patients. That being said, I have had lots of
2 clinical experience, attended surgeries, constantly done the
3 kind of work I've described.

4 Q. Briefly, what are peer-reviewed publications in your
5 field?

6 THE COURT: Before we get to that, you have patents,
7 right?

8 A. I do.

9 THE COURT: But you do not hold an engineering
10 license in any state?

11 A. I do not.

12 THE COURT: Can you explain how those two facts
13 occur?

14 A. Well, I'm not sure how the patent relates to being a
15 licensed engineer.

16 THE COURT: Right. Why would a person take out an
17 engineering license in a given state?

18 A. In some instances, it allows them a kind of certification
19 that allows them to testify in Court. In some states, it's
20 required. Others -- most not, to be able to certify
21 engineering drawings, for instance. I've never had the need
22 for, and have never stood for a professional engineering
23 license. I have always relied on my background, training, and
24 experience and my PhD. And the patent work, anyone can hold a
25 patent, of course.

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1 THE COURT: True, of course.

2 A. You don't have to be a professional engineer, but my
3 background is in mechanical engineering and mechanical
4 engineering design with this clinical activities, and all the
5 anatomics.

6 THE COURT: Thank you.

7 BY MR. PACKIN:

8 Q. Briefly, what are peer-reviewed publications in your field
9 of expertise?

10 A. Let's say a young woman in my laboratory is interested in
11 having her research work published. She writes a manuscript
12 based on the research experiment or analysis we have done.
13 She sends that publication to a journal. The editor of that
14 journal sends the submitted manuscript out to a group of
15 people knowledgeable in the field who make recommendations as
16 to whether it should be accepted, rejected, or returned for
17 revisions. And because it goes through that kind of juried or
18 peer-reviewed process, it is the gold standard of academic
19 publications.

20 Q. Have you authored any peer-reviewed publications in your
21 field of expertise?

22 A. I have.

23 Q. How many?

24 THE COURT: Is this under heading of Refereed
25 Articles in the CV?

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1 A. Yes, Your Honor.

2 THE COURT: That's the same thing as peer reviewed?

3 A. It is.

4 THE COURT: Okay. It looks like the number of
5 authors of some of these things would serve as a referee
6 alone. Go ahead.

7 A. I think that, in fact, reflects, Your Honor, the
8 collaborative nature of multi-disciplinary work so that you
9 usually involve engineering students, engineering faculty, and
10 orthopedists in much of this research.

11 BY MR. PACKIN:

12 Q. And approximately how many peer-reviewed articles have you
13 had published, either as an author or co-author?

14 A. Just under 200, 198.

15 Q. And what, in general, was the subject matter of these
16 peer-reviewed articles, not specifically each article?

17 A. It all deals with biomechanics in one form or another.
18 Much of it having to do with injury biomechanics, strength of
19 the bone, hip fracture, spinal injury. I've done work on the
20 mandible that's directly relevant to this -- or at least the
21 anatomy is.

22 Q. How many chapters and proceedings have you published?

23 A. I think it's over 60.

24 Q. And in what field? In what areas?

25 A. Again, injury biomechanics over a broad range of topics; a

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1 chapter that's widely cited on forensic injury biomechanics
2 dealing with the special requirements of testimony and
3 litigation related to injury biomechanics.

4 Q. Is the forensic application of injury biomechanics
5 something that comes up with frequency?

6 A. Absolutely.

7 THE COURT: The forensic what?

8 BY MR. PACKIN:

9 Q. Are the forensic aspects of injury biomechanics something
10 that comes up frequently?

11 A. It's -- certainly given what I do and what our company
12 does, is the core of our activities and it's why I'm sadly on
13 the road so much.

14 Q. Is it limited to just civil litigation?

15 A. No. I have testified in criminal Court on any number of
16 occasions about shooting, about recreating scenes associated
17 with shootings either by or -- the police or people at each
18 other. I do a fair amount -- we've seen -- since I've studied
19 falls and why grandma -- and I should say, Your Honor, why
20 grandpa breaks his hip as well -- since we have studied falls
21 and published in that area in some detail, we get all the
22 cases when -- and this is horrible to speak about, but when
23 people throw their wives or throw their children off of
24 cliffs, using fundamental physics to look at the trajectory of
25 that throw and comparing it against facts of the case, I've

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1 had way too many of those kinds of cases. I also do patent
2 work because of my background in orthopedic biomechanics.

3 THE COURT: What's the patent -- are you saying you
4 do patent testimony?

5 A. I do patent testimony on invalidity, on -- you know,
6 whether a patent has -- I'm blocking on the word, I'm sorry.
7 But --

8 THE COURT: Whether it has -- whether it's obvious
9 or not -- whether it's --

10 A. I think validity and -- terrible --

11 THE COURT: Infringement?

12 A. Thank you.

13 THE COURT: Infringement.

14 A. I appreciate that.

15 THE COURT: Right?

16 A. So I do infringement and invalidity analyses. I do --
17 I've done recently a royalty case in Federal Court about
18 whether an inventorship case, as to whether someone should be
19 added to a patent.

20 BY MR. PACKIN:

21 Q. Have you published any books?

22 A. I have.

23 Q. How many?

24 A. I've published -- I'm sorry?

25 Q. How many?

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1 A. I've published one book on the issue of falling and hip
2 fractures that was published by the American Academy of
3 Orthopedic Surgeons, and a second textbook on what's called
4 Orthopedic Biomechanics that deals with many aspects of injury
5 biomechanics.

6 Q. And has that text reached a second publication?

7 A. It has gone through two publications while I was co-
8 editor-in-chief of that publication, and now I passed that on
9 to others, and it's, I think, in its fourth edition now.

10 Q. Have you trained PhD students?

11 A. I have. I've trained 22 PhD students in this area of
12 biomechanics. And I am working on what I expect to be my last
13 PhD student who has another six months to go. And I have also
14 been mentor to, I think it's six MD dissertations done at
15 Harvard Medical School.

16 Q. In what fields?

17 A. Again, biomechanical --

18 THE COURT: MDs have to do dissertations?

19 A. They can do dissertations if they wish to.

20 BY MR. PACKIN:

21 Q. In what field have you mentored or trained those PhD and
22 MD dissertation students?

23 A. They are all in some aspect of orthopedic, musculoskeletal
24 science, almost always involving biomechanics.

25 Q. Do you hold any patents?

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1 A. I do. I hold 10 patents that range from -- and I've
2 mentioned some of these, a unique device for treating
3 fractures of the femur with intramedullary rods. I hold a
4 patent for padding the hip to prevent hip fractures using a
5 kind of soft, gushy material that is soft when you sit on it,
6 but when you fall on it, it feeds the forces away from the
7 hip. I have patents on implantable materials that can be used
8 to augment the skeleton and then resorb and are replaced by
9 bone.

10 THE COURT: What is a tug-resistant link?

11 MR. PACKIN: (Laughs).

12 A. That was a patent that, if I have a material that's soft,
13 and I put it together in the right way, if you think about a
14 belt buckle almost, if I pulled that tug-resistant link
15 slowly, it'll come apart. It'll stretch. If I pull it
16 quickly, it stops and holds it cold. So it was a very
17 general-purpose idea to create a link using these unique
18 materials that we had developed.

19 THE COURT: Sounds like a Chinese finger puzzle.

20 A. It is a little like that. If you think of Silly Putty.
21 If you take Silly Putty and pull it apart slowly, no problem.
22 If you take Silly Putty and go really quickly like that --

23 THE COURT: Yes it breaks it.

24 A. It either breaks or gives very high resistance.

25 BY MR. PACKIN:

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1 Q. And you give us a representative indication of the
2 professional societies you belong to or have belonged to?

3 A. I belong to the American Society of Mechanical Engineers,
4 the American Academy of Orthopedic Surgeons as an Associate,
5 which is what's allowed if you're not a physician. I'm a
6 member of the Human Factors in Ergonomics Society. I'm a
7 member of the -- and this is just a partial listing -- of the
8 Society of Automotive Engineers. I'm a member of the
9 International Society, I think, of Safety Engineers. I may
10 not have that term exactly correct. But a broad range of
11 scientific societies. The Orthopedic Research Society.

12 Q. Have you held editorial and review positions yourself
13 where you have been part of the peer reviewing process for the
14 submissions of others?

15 THE COURT: I think we covered that.

16 MR. PACKIN: I'm saying where he would -- okay.

17 THE COURT: Under Professional Activities, I'm sure
18 some of those are peer review boards, right?

19 A. They are, but I think there is a special section on
20 editorial and review --

21 THE COURT: Okay, page six. I see that. I've got
22 it.

23 BY MR. PACKIN:

24 Q. And in what field have your editorial and reviewing
25 positions been?

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1 A. Orthopedic surgery on the one hand, mechanical engineering
2 on the other, and in fact, the Journal of Orthopedic Research
3 that I started sat squarely between the two.

4 THE COURT: Tell me that again.

5 A. So I have served in editorial positions, usually as a
6 member of an editorial board after being a reviewer for
7 journals as disparate as the American Society of Mechanical
8 Engineering all the way to the American Academy of Orthopedic
9 Surgeons, and in between, I was asked by the American Academy
10 of Orthopedic Surgeons to start a new journal in 1983 called
11 the Journal of Orthopedic Research.

12 BY MR. PACKIN:

13 Q. And did you do that, sir?

14 A. I did that for some 12 or 13 years and then passed that
15 burden on.

16 THE COURT: But you say this journal of -- what was
17 the common ground into related disciplines that you just
18 described? Orthopedics and biomechanics?

19 A. Orthopedics and engineering more broadly, and yes,
20 biomechanics was a central focus --

21 THE COURT: Okay.

22 A. -- of all of the publications.

23 THE COURT: Okay. So biomechanics actually -- it's
24 not co-extensive with orthopedics and mechanical engineering,
25 but it draws significantly from both of those fields?

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1 A. Perfect.

2 THE COURT: Okay.

3 BY MR. PACKIN:

4 Q. Dr. Hayes, have you received any training or education in
5 accident reconstruction?

6 A. I have. I've taken post-graduate courses in accident
7 reconstruction. Mostly, I have taught in those sort of
8 courses -- injury biomechanics, because of my background and
9 expertise.

10 THE COURT: So this was in accident reconstruction?

11 MR. PACKIN: Yes, Ma'am.

12 THE COURT: Which, in the trade, has come to refer
13 to vehicular accidents, right?

14 A. Yes.

15 BY MR. PACKIN:

16 Q. Most -- I think he testified most commonly, but it does
17 still have a dovetail with injury biomechanics. Is that
18 correct, sir?.

19 A. Yes. Oh, yeah. I mean, every time we have a car roll
20 over, we have to look at how the person is hurt. Is it
21 because the roof is bad? Is it because they were ejected and
22 weren't seat belted? That sort of thing.

23 Q. Without going into detail at this point as to these
24 issues, are there computer programs and models and
25 mathematical programs that people such as yourself use in the

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1 field of injury biomechanics and accident reconstruction?

2 THE COURT: Okay, that's a big question. Let me see
3 if I understand it. What tools are typically used for
4 accident and incident reconstruction. Is that your question?

5 MR. PACKIN: Yes. What kind of --

6 THE COURT: Analytical tools --

7 BY MR. PACKIN:

8 Q. Analytical tools, models, programs, things of that nature.

9 A. And I think your question also included the injury
10 biomechanics --

11 Q. Yes. Yes, sir.

12 A. -- piece as well.

13 THE COURT: Okay, let's make sure the question is
14 clear. Restate it, please.

15 BY MR. PACKIN:

16 Q. What type, if any, of computer programs, models,
17 mathematical programs do people in the field of accident
18 reconstruction and injury biomechanics use and rely on to do
19 their work?

20 A. We use sophisticated programs that can recreate, based on
21 sometimes photographs, based on direct crush measurements, for
22 instance --

23 THE COURT: And now you lost me. Sophisticated
24 programs -- then you lost me.

25 A. That apply engineering physics to the study of collision

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1 severity related to motor vehicles.

2 THE COURT: I think the question -- well, see, your
3 question, Mr. Packin, was focused on the auto accident -- on
4 the vehicular accident as Dr. Hayes understood it.

5 MR. PACKIN: Apparently so.

6 THE COURT: That's why I was trying to get a clear
7 question.

8 BY MR. PACKIN:

9 Q. In terms of injury biomechanics and accident
10 reconstruction -- or let's start with injury biomechanics.

11 THE COURT: Well, if we could just leave automobiles
12 out of this -- leave vehicles out of this except as Dr. Hayes
13 needs to draw from that related area in order to explain
14 something. So, if we could focus on -- and let's get our
15 nomenclature just clean for purposes of this hearing. I know
16 that scientists use some terms interchangeable. He said today
17 event -- just a second. I'll be right with you. You can take
18 injury biomechanics as a broad description. Within that, he
19 has testified accident reconstruction has come to refer mostly
20 to vehicles, and the terms incident reconstruction and event
21 reconstruction will cover the rest of injury to the body.

22 MR. PACKIN: So --

23 THE COURT: So, I don't care how you put the
24 question, but if you use that vocabulary, we'll understand the
25 question.

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1 BY MR. PACKIN:

2 Q. In the field of injury biomechanics --

3 THE COURT: Okay.

4 BY MR. PACKIN:

5 Q. -- incident reconstruction, event reconstruction, not in
6 the automobile accident context, does your discipline -- does
7 your profession use computer or mathematical models or
8 computer programs?

9 A. We do.

10 Q. What do you use?

11 A. We use a variety of software to first, characterize the
12 scene of the event, if we're talking about event
13 reconstruction; where are -- and sometimes we're forced to
14 rely on pictures. We can't directly examine the scene. That
15 discipline is called, as we will see, photogrammetry; that is,
16 the study of physical objects from photographs primarily.

17 THE COURT: Just a second. P-H-O-T-O-G-R-A-M-M-E-T-
18 R-Y?

19 A. Perfect.

20 THE COURT: Is the study of what?

21 A. It's the study of -- it's obtaining reliable measurements
22 from photographic evidence --

23 THE COURT: Okay.

24 A. -- I think is a simple --

25 THE COURT: Obtaining reliable measurements from

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1 photographic --

2 A. Images.

3 THE COURT: Okay. And you use computers to help you
4 do that?

5 A. We do. Secondly, we use anthropometry, which we've
6 already -- I've already defined as the study of human size and
7 shape. And you can put those two together to fit a person in
8 a scene.

9 THE COURT: I understand.

10 A. And then you can use the fundamental laws of physics to,
11 in a sense, bring that to life and look at the expected forces
12 and directions of objects in the scene, be they --

13 THE COURT: Looking at forces and directions of
14 objects --

15 A. Objects --

16 THE COURT: -- in the --

17 A. And just to take from a couple of examples. If someone is
18 shooting, how does a particular bullet go through a victim?
19 Or part of the scene, for instance, would involve the
20 connection of those two disciplines. Or this particular case,
21 exactly involves those two kinds of disciplines.

22 THE COURT: What two kinds of disciplines?

23 A. Photogrammetry and anthropometry.

24 THE COURT: Those are techniques -- discipline --
25 Okay, that's fine.

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1 BY MR. PACKIN:

2 Q. Are those tools, photogrammetry and anthropometry,
3 something regularly used and relied upon in your field?

4 A. They are used in my field as well as throughout our entire
5 culture.

6 Q. We'll get into those in more detail. How many times have
7 you given deposition testimony in your career as an expert
8 witness in your field since 2000?

9 A. I'm turning to a Testimony and Analysis Binder in front of
10 me. There's a tab, Testimony History, and I have given 319
11 depositions since 2000, and I have testified in 206 trials
12 since the year 2000.

13 THE COURT: Would you call this part of a trial? I
14 mean, here we are.

15 A. I would call this a hearing.

16 THE COURT: It's hearing, actually. So, is your 206
17 number inclusive of hearings?

18 A. I don't think so, no.

19 THE COURT: Any hearings? Have you done a hearing
20 such as this anywhere?

21 A. I have done Daubert hearings galore. I've done Frye
22 hearings.

23 THE COURT: Okay, so that's -- that would be more.

24 A. That would be --

25 THE COURT: Appearances. Separate from depositions

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1 and trials, in your listing?

2 A. That would.

3 THE COURT: Okay. Plus Daubert and Frye hearings.

4 Okay.

5 BY MR. PACKIN:

6 Q. Have all of these been in the field of injury biomechanics
7 or mechanical engineering?

8 A. Put that way, yes. As long as patents, and to the extent
9 that comes up in patent litigation would be included as well.

10 Q. Has any Court --

11 THE COURT: Mechanical engineering, then, right?

12 BY MR. PACKIN:

13 Q. Has any Court ever refused to accept your qualifications
14 to testify in your field?

15 A. I think there are some Courts that have insisted that
16 injury causation can only be testified to by those holding an
17 MD. And in those instances, in the vast majority of cases, I
18 have been allowed to testify on general causation as opposed
19 to specific causation of a particular person's injuries.
20 There was a case in Texas, the Acevedo (phonetic) matter where
21 the Judge came to the conclusion that biomechanics was not a
22 reliable scientific field, and I understand excluded both
23 sides' biomechanical experts on those grounds. And the rest
24 fall under this idea of whether you have to be a physician in
25 order to testify as to causation.

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1 Q. Other than the Acevedo matter, the one case out of these
2 several hundred where the Judge determined that injury
3 biomechanics was not going to be accepted and both sides were
4 excluded, have your qualifications been accepted in all other
5 cases?

6 A. Yes, in terms of those kinds of hearings, yes.

7 Q. Now, Dr. Hayes, your CV runs some 23 pages, and it also
8 includes much more information about your faculty
9 appointments, hospital administrative appointments, honors,
10 awards, professional societies and activities, grants,
11 editorial and review positions, theses that you've supervised,
12 refereed articles, which itself goes on to list some 198,
13 chapters and proceedings, books, patents -- we've only touched
14 on some of them, and not to the derogation necessarily of
15 others, are all of those listings on the CV accurate and
16 current?

17 A. I certainly hope so. Except for the alignment of the
18 dates on the first page.

19 MR. PACKIN: And Your Honor, on that basis, we have
20 offered Dr. Hayes in this case, and do offer him as an expert
21 in injury biomechanics, in orthopedics and mechanical
22 engineering --

23 THE COURT: Just a second. Injury reconstruction?

24 MR. PACKIN: Injury biomechanics.

25 THE COURT: Okay.

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1 MR. PACKIN: We'll call it incident/accident
2 reconstruction -- recognizing the limitation that Dr. Hayes
3 has given to it. And mechanical engineering, although I do
4 honor my representation to Defense counsel that we have not
5 offered Dr. Hayes in this case as an expert to evaluate the
6 design of the saw itself. We have not offered him for that
7 purpose. And in orthopedics to the extent there are some
8 orthopedic injuries here. And with the Court's permission,
9 I'll proceed to the substantive aspects.

10 THE COURT: Just a second. Just a minute, Mr.
11 Walsh?

12 MR. WALSH: Yes, Ma'am.

13 THE COURT: I just have 1 small area of inquiry.

14 MR. PACKIN: Yes, Ma'am.

15 BY THE COURT:

16 Q. Dr. Hayes, most of your work has focused on skeleton,
17 cartilage, and obviously the musculoskeletal system, at least,
18 as we've heard this morning. Most of the injuries here were
19 the physical entry of this blade into this person's flesh. It
20 cut through nerves. It cut through muscles. It broke the
21 jaw. Among other things. Right?

22 A. Yes.

23 Q. Is that whole range of injury something that you consider
24 yourself to be qualified to discuss from the perspectives of
25 the professional fields for which you are being offered?

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1 A. I do, Your Honor. I taught the head and neck -- parts of
2 the head and neck at Harvard for some 18 years. It also --
3 the blade left a track through anatomic regions of the
4 mandible through the parotid gland through, as you say, nerves
5 and vessels, all of which I am familiar with the anatomy. It
6 created -- I mentioned comminution. That gives me a sense as
7 to the energy levels involved.

8 Q. The comminution of the jaw fracture?

9 A. Yes, the -- close to the temporomandibular joint is --

10 Q. Okay.

11 A. -- noted as highly comminuted.

12 Q. Bones, nerves, the works, right?

13 A. Though --

14 Q. As well as the external injury?

15 A. As well as the external injury.

16 THE COURT: Okay, thank you. That was my only
17 question.

18 MR. PACKIN: Just a followup question along that
19 line.

20 BY MR. PACKIN:

21 Q. Dr. Hayes, when you did your work, both clinical and
22 teaching in the area of orthopedic injuries and
23 musculoskeletal injuries, did those on occasion involve
24 lacerations and injuries to the soft tissue as well?

25 A. They did, very much so, yes.

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1 Q. And was that part -- was part of your analysis and
2 evaluation and teaching -- did that also involve analysis of
3 those soft tissue injuries related to the orthopedic injuries
4 as well?

5 A. It did. Using, as I've said to the Court, the comminution
6 of bone has a kind of marker to what kinds of injuries we can
7 expect to the anatomy around the fractured bone.

8 Q. Orthopedic injuries are sometimes caused by blunt trauma
9 that doesn't cause soft tissue injury, correct?

10 A. Of course.

11 Q. Sometimes by penetrating trauma that does cause soft
12 tissue injury?

13 A. Yes.

14 Q. Did your work involve both?

15 A. Yes.

16 Q. Does this particular case involve both?

17 A. Yes.

18 MR. PACKIN: Thank you.

19 THE COURT: And comminuted means a -- you already
20 explained. Means a scatter pattern of fracture rather than a
21 clean fracture?

22 A. It means -- I think the easiest way to think of it is just
23 multiple fragments.

24 THE COURT: Multiple fragment bone injury rather
25 than a clean --

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1 A. Yes, I could think of a bone breaking into two pieces with
2 a clean fracture and comminuted would mean many pieces.

3 THE COURT: What's the opposite of comminuted in med
4 terms?

5 A. Sometimes they're called simple.

6 THE COURT: Oh.

7 A. Just plain simple fractures.

8 THE COURT: Okay, fine. Thank you.

9 A. Usually they're given a direction. A transverse fracture
10 --

11 THE COURT: Right.

12 A. -- and oblique.

13 THE COURT: Right. Okay. Mr. Walsh what is your
14 inclination here, sir? Do you want to address me?

15 MR. WALSH: Well, we can do it however Your Honor
16 wants. I will note that on subjects such as offering him from
17 an orthopedic standpoint, well beyond the reports. There is
18 nothing in the reports in which he discusses any orthopedic
19 basis for any of his opinions. He recites some of the medical
20 history, but when he does his analysis, there is no discussion
21 of orthopedic elements to that discussion. So we're --

22 THE COURT: Okay. That goes beyond qualifications,
23 though.

24 MR. WALSH: It goes beyond qualification. If Your
25 Honor will -- we can do it -- I can Voir Dire him now on his

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1 qualifications, or I can -- Your Honor can reserve her ruling
2 on his qualifications -- you can let Mr. Packin finish, and I
3 can do everything at once. It's up to you.

4 THE COURT: Does it make a difference to you?

5 MR. PACKIN: It does not make a difference to me --

6 THE COURT: Okay.

7 MR. PACKIN: -- as long as you reserve your ruling,
8 Your Honor.

9 THE COURT: Sure. Let's just move along with the
10 direct then, and I think we're due for a recess.

11 MR. PACKIN: Thank you, Your Honor.

12 THE COURT: Okay? When I declare recess, everybody
13 gets up and mills around. You don't just stand waiting for me
14 to depart.

15 (Court recessed)

16 THE COURT: Okay. On we go.

17 MR. PACKIN: Thank you, Your Honor.

18 DIRECT EXAMINATION

19 BY MR. PACKIN:

20 Q. Dr. Hayes, your initial report in this case was authored
21 on November 3, 2009, correct?

22 A. Yes.

23 Q. And you were asked to address some particular issues in
24 that report. You were asked by my office to address some
25 particular issues, correct?

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1 A. Yes.

2 Q. Those are the issues that are set forth on page six in
3 paragraph 15?

4 A. They are.

5 Q. And the first issue, sir, was, please read into the
6 record.

7 A. Would you like me to read it in?

8 Q. Yes.

9 A. Or give a --

10 THE COURT: Just read it. And there will be
11 followup questions.

12 A. "The questions you've asked me to address to a reasonable
13 degree of engineering and biomechanical certainty are: 1) Was
14 there sufficient space between the two pipes such that Mr.
15 McGee could position himself between them, be properly
16 balanced, and complete the second cut in a biomechanically
17 safe manner?"

18 Q. The second question, please?

19 A. "2) Does the evidence in this case support a scenario with
20 Mr. McGee losing his balance, falling to the ground, and then
21 being struck in the face by the cut-off machine while on the
22 ground as --

23 Q. Number 3.

24 A. -- indicated in the Falls Township Police Incident
25 Report?"

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1 Q. And number 3 -- I'm sorry to have talked over you.

2 A. And "3) Could the accident have been prevented by
3 supporting the pipe with a strap configuration attached to a
4 crane or a forklift?

5 Q. Dr. Hayes, did you feel that those questions were within
6 your area of knowledge, education, training, and expertise?

7 A. I did, and I do.

8 Q. You were supplied with materials by our office to review
9 in this matter prior to rendering that November 3, 2009
10 report, true?

11 A. Yes.

12 Q. And those materials are listed by you in your report on
13 page 2, starting with paragraph 9, and running over to page 3
14 as well, correct?

15 A. Correct.

16 Q. Would you please go through those materials item by item
17 and give us generally how those items provided you with facts,
18 data, or information relevant to your inquiry in this case.
19 You don't have to give us, for example, with depositions,
20 every single fact that you learned, but just generally in
21 terms of each of those items?

22 A. I had various pleadings. I reviewed interrogatories by
23 both sides, which gave me information on birth date, on time
24 involved in this incident on the particular saw involved, and
25 as I recall, its model number. I had a police report from

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1 Falls Township which described without attribution various
2 witness statements made to the police department. I had an
3 incident and accident report which told me some of the
4 witnesses and those who were on the scene. It also gave me
5 information as to the timing of the incident. I also got
6 information as to the blade involved, people who actually
7 witnessed the event, including Steve Caldwell (phonetic) and
8 Tony Rivera (phonetic). Then I had background information on
9 the saw itself. I had 38 black-and-white photographs of the
10 scene, which were subsequently followed up with 35 color
11 photographs of the scene, which allowed us through the use of
12 photogrammetry to characterize knowing the dimensions of the
13 pipe and the timing of the incident, the distances apart and
14 above the ground that the two involved pipes were. I had a
15 set of 11 photographs of the Plaintiff himself, which allowed
16 me to directly connect the superficial injuries sustained to
17 the rest of the geometry of the scene.

18 Q. By the way, just to interrupt for a second. Are the 35
19 color photographs the packet that we've presented to the Court
20 as P-5?

21 A. I believe so, although I don't have the exhibits that the
22 Court has in that form, but that's my understanding.

23 Q. Are the 11 photographs the color photographs we presented
24 at P-6?

25 A. Yes.

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1 Q. Okay. Continue, please.

2 A. Then I have depositions from the -- oh, sorry. I have a
3 report from Dr. Mamoun, M-A-M-O-U-N, who has described, based
4 on a review of the medical record the actual injuries
5 sustained. I have medical records that came in various
6 mailings that again provided detailed descriptions of the
7 injuries sustained, the treatment provided, which on occasion
8 gave me further information about the anatomy of the injuries.
9 I had radiographic progress notes that described the
10 radiology. Then I had depositions from Mr. McGee, who
11 provided descriptions of the incident as he recalled it. Also
12 produced some descriptions of the event as he was asked to
13 recreate it at the deposition itself. I have depositions of -
14 - sorry.

15 THE COURT: And a lot of witnesses' depositions?

16 A. I have a lot of witnesses' depositions, including the
17 witnesses who were -- either saw the event or saw it in their
18 peripheral vision. And those were important. I have an
19 understanding from those depositions about roughly their
20 vantage point and their distance away from the event itself.
21 And I have a deposition of what I understand to be the person
22 most knowledgeable from STIHL as to his expertise and
23 understanding of the saw and its design. And I think without
24 going into excruciating detail on each and every one of those,
25 those are the kinds of materials that I relied on and

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1 typically rely on in situations such this one.

2 Q. You have the deposition of an Anton Spiritosanto is that
3 correct?

4 A. Yes.

5 Q. He's a police officer who filled out that police report?

6 A. Yes.

7 Q. Falls Township police report, correct?

8 A. Yes.

9 Q. Did that inform you in any way?

10 A. Yes, it informed me. Also, I believe it required that we
11 address a question that he gleaned from the various interviews
12 that he conducted as to how this event occurred. And that's
13 the motivation for your office, I believe, asking me about
14 question 2) --

15 THE COURT: I understand.

16 BY MR. PACKIN:

17 Q. By the way. In that deposition, was he able to attribute
18 the description that he put in the police report to any
19 witness?

20 A. He was not, in fact, able to attribute that description of
21 him falling and then being injured by the saw to anyone.

22 Q. In the depositions of the many individuals who were at the
23 scene of the accident, did any of them claim to have seen it
24 occur that way as described in the police report?

25 A. I don't think there's any support for that notion.

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1 Q. Okay.

2 A. In fact, just the opposite.

3 Q. Listed in your report is also the DVDs showing video
4 testimony of Robert McGee, is that correct?

5 A. Yes.

6 Q. So, you had the depositions both in typewritten and video
7 format?

8 A. I did.

9 Q. And did that include, in video format, the so-called
10 demonstration of how the accident happened that he was asked
11 to do?

12 A. It did.

13 Q. Now, you also were involved in a prior matter; the Stout
14 case, correct?

15 A. I was.

16 Q. That was not that long before this case came to your
17 office, is that correct?

18 A. Best estimate just as I sit here, maybe 6 months to a year
19 before, something in that time frame.

20 Q. And you had the materials from the Stout case as well
21 regarding that accident?

22 A. I did.

23 Q. As well as --

24 A. And do.

25 Q. I'm sorry?

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1 A. I did and do.

2 Q. As well as the materials from that case involving the saw
3 and the blade? Is that correct?

4 A. Yes.

5 Q. Was it your understanding that the make and model of the
6 saw were the same in both cases?

7 A. It is my understanding, yes.

8 Q. Is it your understanding that the make and model of the
9 saw blade was the same in both cases?

10 A. That's my understanding, yes.

11 Q. From your review of these various materials, what was your
12 understanding, generally speaking, of the nature, extent, and
13 location of the injuries sustained by Mr. McGee?

14 THE COURT: Just -- I just didn't hear the question.

15 BY MR. PACKIN:

16 Q. Okay. From your review of the various materials, and in
17 your report you've set out a medical synopsis in paragraph 11,
18 12, 13, 14 -- what was your understanding as to the nature,
19 extent, and location of the injuries sustained by Mr. McGee?
20 And I understand you brought with you a slide that shows some
21 of those 11 photographs, so if you want to refer to that?

22 A. I can. Is that all right, Your Honor?

23 THE COURT: Nature and extent of the injuries
24 Plaintiff sustained, right?

25 MR. PACKIN: And location, Your Honor. Nature,

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1 extent, and location.

2 THE COURT: Nature, extent, and location of his
3 injuries. And what do you want to use?

4 MR. PACKIN: Dr. Hayes has made a slide that
5 includes three of the pictures that are in P-6.

6 THE COURT: Sure, as long as you show it to your
7 adversary before it's presented to me. And for that matter,
8 if you have a bunch of slides, this is the time to share them.

9 MR. PACKIN: We may not use them all, so --

10 THE COURT: One by one, then?

11 MR. PACKIN: Yes. With counsel's consent, then,
12 we'll show that slide of the three images.

13 THE COURT: Okay. Could we just get a marking for
14 this slide? It's a hearing exhibit. I know it's
15 demonstrative, but I'm going to ask that you mark it as a P
16 Exhibit.

17 MR. PACKIN: I can have it produced. It's on a page
18 with two others that we're probably not going use, so I can
19 mark it on my copy and then have a single image produced
20 subsequent to the hearing and send it to everybody?

21 THE COURT: That's fine, and we'll just make a cut
22 copy of it today so we have it. The image.

23 MR. PACKIN: I'll call this then P-7.

24 (Plaintiff's Exhibit-7 previously marked for
25 identification)

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1 THE COURT: P-7. Any objection, Mr. Walsh?

2 MR. WALSH: No objection.

3 THE COURT: P-7 is demonstrative slide in evidence,
4 using -- how many of these photos?

5 (Plaintiff's Exhibit-7 admitted into evidence)

6 MR. PACKIN: Three.

7 MR. PACKIN: Okay fine.

8 A. And in order to -- and this is a question, Your Honor, in
9 order to get to the specific slide, I need to put the slides
10 up and go through them.

11 THE COURT: That's fine. When you're ready, I will
12 look. Are you ready now?

13 A. Yes.

14 THE COURT: Okay.

15 A. This is a figure that is actually also reproduced in my
16 report of November 3rd, 2009 as Figure 2. The first
17 indication as to the injuries can be seen from the scarring
18 that remains. And if we look first to the left, he has from
19 the corner of the mouth going back in a curved pattern toward
20 the ear, a laceration that was characterized as starting from
21 anteriorly and moving to posteriorly and more superficial at
22 the front and deeper at the back.

23 THE COURT: Described as deeper at the back, right?

24 A. More superficial anteriorly and deeper as it went
25 posteriorly, crossed under the ear, and continued across the

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1 neck. There is secondly a roughly perpendicular laceration
2 that was to the side of his neck and went primarily vertically
3 creating a kind of crossed pattern.

4 THE COURT: Running essentially vertically -- just a
5 second. Would you show the point where the two cross
6 together? It's directly behind the earlobe?

7 A. Directly behind the earlobe, and I'll run my pointer from
8 the distal margin of that laceration upward. That's the
9 primarily vertical, and this first laceration occurred
10 horizontally.

11 THE COURT: I see. Okay.

12 BY MR. PACKIN:

13 Q. Now --

14 THE COURT: Length? They describe the length of
15 these two lacerations?

16 A. As I recall, 14 cm and 9 cm.

17 THE COURT: 14 would be the mostly --

18 A. Longer one.

19 THE COURT: -- horizontal one?

20 A. Yes. As I recall.

21 THE COURT: And 9 would be the vertical one?

22 A. Yes.

23 THE COURT: Okay.

24 BY MR. PACKIN:

25 Q. I believe you mentioned earlier also that the mandible or

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1 the jawbone was severed?

2 A. I was going to move from superficial --

3 Q. Okay.

4 A. To deep, which is the way we traditionally go about this.
5 He had a transverse laceration through the masseter muscle,
6 and if you take your hands, put them by the side of the angle
7 of the mandible, your jaw, now grit your teeth. That muscle
8 that you feel right there is the masseter muscle.

9 THE COURT: For the record, we have to spell these
10 terms, because we are using a digital tape recording. M-A-S-
11 S-E-T -- M-A-S-S-I-T-E-R?

12 A. M-A-S-S-E-T-E-R.

13 THE COURT: Thank you. Okay.

14 A. He also had --

15 MR. WALSH: Your Honor, I am going to renew my
16 objection to discussions of anything except the scar pattern
17 which is the only thing discussed in the report by this
18 witness. The others are simply summaries of hospital reports.
19 There is nothing in the analysis that relies on anything
20 interior to the injury for any of the analysis in this
21 witness's report.

22 THE COURT: I'll see you at the side.

23 (Sidebar on the record - began at 11:35 a.m. and ended at
24 11:38 a.m., transcribed under separate cover)

25 THE COURT: If you wish to place further argument on

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1 the record during the recess, make a note, sir. Just to
2 preserve your argument in its extent.

3 MR. WALSH: I assume -- I just have a continuing
4 objection to this. I don't want to interrupt the examination
5 by objecting, so I will have a continuing objection to this
6 line of questioning, please.

7 THE COURT: Very well. Okay, so we're talking about
8 pattern of injuries. And I think that we had gotten to the
9 fact that as the laceration is explored through the medical
10 examination and treatment, this transverse laceration goes
11 through the masseter muscle, and that's when the objection
12 came.

13 MR. PACKIN: Yes, Ma'am.

14 THE COURT: So I've ruled on the objection. You may
15 proceed. But ask a new question.

16 BY MR. PACKIN:

17 Q. And continue, if you would, with your description of the
18 injury as it went from superficial to more interior.

19 A. And so I'm going from anterior to posterior at the next
20 level, went through the masseter muscle, went through the
21 parotid, P-A-R-O-T-I-D gland, which produces saliva.

22 THE COURT: Okay. This laceration -- next. I'm
23 sorry to be slow, but it helps me to focus also when I take
24 the notes. And watch, sir, whatever you do, do not back up.
25 Please.

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1 A. I do injury biomechanics, Your Honor.

2 THE COURT: This laceration next went through the
3 parotid, P-A-R-O-T-I-D gland, right?

4 A. Yes.

5 THE COURT: Which is good for saliva?

6 A. Which is what produces saliva.

7 THE COURT: Okay. Go ahead.

8 A. In so doing, it lacerated the facial nerve and several of
9 the distal branches of the facial nerve that have resulted in
10 his longer-term inability to control parts of his face.

11 THE COURT: He says he's missing four nerves?

12 A. Yes. All branches of the facial nerve.

13 THE COURT: Okay.

14 A. He -- also, if we move deeper, there was a fracture,
15 transverse and comminuted to the coronoid, C-O-R --

16 THE COURT: Just a minute. Sorry. Transverse
17 comminuted fracture of the right side of the mandible?

18 A. Yes, to two places in the right side of the mandible, the
19 coronoid, C-O-R-O-N-O-I-D process --

20 THE COURT: Process?

21 A. Yes.

22 THE COURT: Go ahead.

23 A. As well as the mandible itself where it enters the
24 temporomandibular joint.

25 THE COURT: Where it enters the joint.

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1 A. Yes, and that is a highly comminuted --

2 THE COURT: Right?

3 A. Yeah, a little higher. Where you --

4 THE COURT: At the cheekbone?

5 A. Yes. And that is as I've indicated by earlier testimony,
6 direct evidence as to --

7 THE COURT: Yeah, I interrupted you. That is a
8 highly what?

9 A. Comminuted --

10 THE COURT: Right.

11 A. -- fracture --

12 THE COURT: Got it.

13 A. -- that indicates the energy associated with this event.
14 And in the main, those are the most reflective of his
15 positioning at the time of the accident.

16 THE COURT: What about this hole up and down scar
17 thing? Without reaching conclusions, does this inform your
18 analysis of his position at the time of the accident?

19 A. It absolutely informs my analysis, and I can demonstrate,
20 Your Honor, how the second vertical cut occurred as well. If
21 you would like me to do so?

22 THE COURT: I'm not going to solicit testimony
23 today. Mr. Packin, it's up to you.

24 BY MR. PACKIN:

25 Q. First, another question for you. Did knowing the nature,

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1 extent, and location of the injuries play any importance in
2 your analysis of any of the three questions that were posed to
3 you in this case?

4 A. Yes, it was crucial to my understanding of his positioning
5 as well as my conclusions as to whether these injuries
6 occurred and caused his subsequent falling or the converse.

7 Q. Okay. Now, on this slide, it says injuries can be used as
8 a signature to the event, which I believe was stated in your
9 deposition, and I believe in your report as well.

10 A. Yes.

11 Q. What do you mean by that? Explain to us what you mean by
12 that.

13 A. In something that occurs as quickly as what is in lay
14 terms referred to as a kickback event where a saw or some
15 other object goes into a person's body, the geometry of these
16 lacerations and the deeper injuries that occur tell you how
17 that face had to be positioned with respect to the saw. And
18 in this instance, if we know where it started, and we know
19 where it ended up, we can connect those dots.

20 Q. Okay.

21 A. What was potentially confusing about this is the vertical
22 --

23 Q. And what did you determine regarding that? The vertical?

24 A. Your Honor, could I step down into the well?

25 THE COURT: Sure. The only problem being, you have

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1 to take direction on how we can still pick you up on the
2 microphone.

3 A. Oh, I can do it here. I can do it here just fine. It
4 saves the trouble.

5 THE COURT: Okay.

6 A. I'm standing and bending over, and I'm not trying to
7 produce the low -- the position of the lower part of my body,
8 but such that the Court can see I'm simply trying to produce
9 the interaction between this rotating 14-inch saw blade and
10 the face.

11 THE COURT: You've got a paper plate? A round paper
12 plate about 10 inches, 8 inches?

13 A. I would say -- I'll go with that; 8 or 10 inches. We know
14 from the medical records that it went from front to back,
15 anterior to posterior. His face is, I believed, positioned
16 over the saw blade region at a location that matches the first
17 of these lacerations, back toward the ear.

18 THE COURT: The transverse one?

19 A. The transverse fracture. So, I can produce that by simply
20 aligning the top of this plate between the corner of my lips
21 and the bottom of my ear. Now, if I realize that this is then
22 a dynamic event where impact forces were imposed on the saw
23 and the saw moved such that it caused an impact force on his
24 face, note that if I have the --

25 THE COURT: Just a second. Knowing that this thing

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1 is moving, right?

2 A. Yes.

3 THE COURT: This apparatus is moving.

4 A. It is a moving object which, from the laws of physics,
5 tells me that it has what we call momentum. It strikes his
6 face, creates these lacerations and injuries and knocks his
7 face back and to the left, and if we keep the saw moving in
8 this direction, it produces the rough alignment underneath the
9 ear and to the side of the neck. So it's simply a consequence
10 of the dynamic motion of the face in response to being struck
11 by the saw.

12 THE COURT: So, you're saying the striking of the --
13 the first strike of the saw to the face jolts the position of
14 the head?

15 A. Perfect.

16 THE COURT: Creating the head to jolt, right?

17 A. Yes, back and to the left, and then produces the alignment
18 of the cut along the neck.

19 THE COURT: In other words, the vertical cut?

20 A. The roughly vertical cut, yes.

21 THE COURT: I'm just trying to distinguish the two.
22 You've got the sideways cut which is transverse, and then the
23 -- you're saying that the vertical cut is second --

24 A. Yes.

25 THE COURT: -- in sequence?

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1 A. Yes.

2 THE COURT: Go ahead, counsel.

3 MR. PACKIN: Thank you.

4 BY MR. PACKIN:

5 Q. In addition to the photographs of the injuries and the
6 medical description of the injuries, you had photographs of
7 the accident scene as it appeared after the accident and
8 before anything further was done to the scene or the pipes,
9 correct?

10 A. Yes.

11 Q. And those were among the 35 color photographs that we've
12 marked as P-5, correct?

13 A. Yes.

14 Q. And I understand you've prepared two slides with four
15 images from those 35 photographs showing -- demonstrating some
16 of the accident scene photographs that you used in your
17 evaluation in this case, is that correct?

18 A. It is correct, although it would be my suggestion only to
19 use the second of those so we keep a consistent perspective
20 and view of the scene throughout all the photographs.

21 Q. What -- that's fine.

22 A. Or to the extent that we can.

23 Q. All right. Just -- before you put it up, then show me
24 which of these you're referring to and I'll show them to
25 counsel.

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1 A. It is the second of the two background accident scene --
2 it's simply this view.

3 THE COURT: Counsel, before you proceed, are we
4 talking about P-5?

5 MR. PACKIN: Yes, Ma'am.

6 THE COURT: And the second of those photos is simply
7 a picture of the machine.

8 MR. PACKIN: They're not in the same sequence.

9 THE COURT: Right.

10 MR. PACKIN: They're not in -- I can show you --
11 once it's up here, it'll be apparent.

12 MR. WALSH: We have no objection, Your Honor.

13 MR. PACKIN: Once it's up, it'll be apparent which
14 photographs they are.

15 THE COURT: All right. Well, I'm going to be, as
16 usual, troublesome, and since we've got P-5 marked as an
17 exhibit for purposes of this hearing, and we know, or we hope,
18 it's 35 photos in toto, we're going to pencil mark each one of
19 them, and then we're going to say that this -- whatever photo
20 we're using is P-5-6 or something. Okay?

21 MR. PACKIN: All right.

22 THE COURT: Okay.

23 MR. PACKIN: If you would put up that slide, Dr.
24 Hayes, and I'll find the photograph. The one on the left,
25 Your Honor, would be the 20th photograph in the packet. The

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1 one on the right --

2 (Pause in proceedings)

3 THE COURT: Can I see you at the side, please?

4 MR. PACKIN: I'm sorry?

5 THE COURT: I'd like to see counsel at the side,
6 please, for this exercise.

7 (Sidebar on the record - began at 11:52 a.m. and ended at
8 11:53 a.m., transcribed under separate cover)

9 (Court in recess)

10 (Sidebar off the record)

11 THE COURT: Mr. Packin, you will reconstitute this
12 group of photographs that you believe to be a total of 35, but
13 for convenience right now, we're still within hearing Exhibit
14 P-5, and you have selected two photos that don't happen to be
15 until later in the group because you have some duplicates in
16 here. So you have arbitrarily assigned them numbers 36 and
17 37 --

18 MR. PACKIN: Yes, Ma'am.

19 THE COURT: -- and we can see which ones they are,
20 and when you go back and fix up this exhibit, it'll have maybe
21 37 pages, but two of them will probably be intentionally left
22 blank so as to reduce this to the 35 photos that you know
23 exist.

24 MR. PACKIN: Understood.

25 THE COURT: Okay, fine. Any objection, Mr. Walsh?

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1 MR. WALSH: No objection.

2 THE COURT: Okay. Thank you, sir.

3 MR. PACKIN: May I continue?

4 THE COURT: So yes, P -- just a second. P-5(36) is
5 a closeup of a cut but not severed pipe.

6 MR. PACKIN: P-8 --

7 THE COURT: And P-5(37) is a landscape shot of two
8 pipes, right?

9 MR. PACKIN: No. This slide that's up, we would
10 call P-8 since it's the next slide in sequence. The photo on
11 the left in P-8 is #31 in Your Honor's packet. The photo on
12 the right is #36.

13 (Plaintiff's Exhibit-8 previously marked for
14 identification)

15 THE COURT: In other words, you have a slide on the
16 screen --

17 MR. PACKIN: Yes.

18 THE COURT: And you're going to mark that P-8?

19 MR. PACKIN: Correct.

20 THE COURT: Okay. Just a minute, please. Just a
21 minute.

22 (Pause in proceedings)

23 THE COURT: P-6 is slide containing 2 photos --

24 MR. PACKIN: P-8, Your Honor.

25 THE COURT: P-8. Any objection to P-8 as a

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1 demonstrative?

2 MR. WALSH: No objection, Your Honor.

3 THE COURT: Okay, P-8 in evidence.

4 (Plaintiff's Exhibit-8 admitted into evidence)

5 THE COURT: And the two photos are from P-5, #31 --

6 MR. PACKIN: Yes, Ma'am.

7 THE COURT: -- in this faulty compendium, right?

8 MR. PACKIN: Yes. It's -- and the one on the left
9 is the landscape view, as Your Honor called it, number 31 in
10 your numbering, which is sequential.

11 THE COURT: Just a minute. It's page 31, so it's P-
12 5(31) at the moment, right?

13 MR. PACKIN: Yes, Ma'am.

14 THE COURT: And what's the other one?

15 MR. PACKIN: And the one on the right --

16 MR. PACKIN: Is the one I've tabbed at the top and
17 numbered 36 at the bottom.

18 THE COURT: P-5(36). Okay. Thank you. We're all
19 set.

20 MR. PACKIN: Thank you, Your Honor. Sorry for the
21 confusion.

22 BY MR. PACKIN:

23 Q. So, getting back to where we were, Dr. Hayes, besides the
24 photographs of the injuries to Mr. McGee's face, you have
25 photographs of the accident scene as it appeared shortly after

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1 and before the pipes were worked on further. Is that your
2 understanding?

3 A. Yes.

4 Q. And P-8 is a slide you prepared with two of those
5 photographs as we've identified them for the Court?

6 A. Yes.

7 Q. What did the photographs, take them from left first, and
8 then right, provide you in the way of information relevant to
9 your investigation and evaluation in this case?

10 A. This gave me background information on the placement and
11 path of the pipes, likely before, and then shortly after Mr.
12 McGee was injured, and allows me to describe in general terms
13 the sequence of events and their consequence on the paths of
14 these two pipes.

15 Q. Was it your understanding that the photograph on the left
16 represented the two pipes as they appeared after the accident
17 and were photographed by the police at the scene?

18 A. Yes.

19 Q. And what was your understanding as to what was shown in
20 the photograph on the right, which is number 36 in the Court's
21 packet?

22 A. The photograph on the right, which is a closeup of the cut
23 -- and let me amend that to say cuts, made by Mr. McGee on the
24 pipe. It is a vertical, top-down view, and shows to the right
25 the -- what's left over from the first cut that he described,

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1 and then shows to the left of that figure, a closeup of the
2 pipe, the second cut, the topmost region, and finally shows
3 the ligament, as I've referred to it, that remains between the
4 two cuts on the top side of the pipe.

5 THE COURT: So you're saying the first cut is in
6 closed position, right?

7 A. The first cut --

8 MR. PACKIN: Open.

9 A. -- is in open position.

10 THE COURT: Right.

11 A. With the kerf being the material removed by the saw blade
12 --

13 THE COURT: Just a second.

14 A. That's K-E-R-F.

15 THE COURT: K-E-R-F. Does kerf refer to the cut or
16 the material removed from the space where the cut is?

17 A. They overlap a bit. The kerf is really meant to describe
18 the -- if this was undisturbed by the internal stresses in the
19 pipe and there wasn't opening and closing, if we just had a
20 plain saw cut, we would call that open region the kerf.

21 THE COURT: Kerf describes the cut, right? And
22 sometimes includes to mean the material removed from the cut
23 kerf cavity. No?

24 A. That's fine. The kerf, if we think of an undisturbed
25 piece of wood and we bring a saw down into it, take the saw

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1 out, and we don't have issues of bending of the wood or
2 closing of any of this, that slot --

3 THE COURT: Aha.

4 A. I think slot's a good word, describes the kerf.

5 THE COURT: Okay, that's fine. So, we've got the --
6 you're showing the first cut, and you've labeled it "open
7 kerf," and then you've put an arrow to what you describe as a
8 second cut and call it a "closed kerf," and obviously the
9 photo shows the amount of opening or lack there of in each of
10 these cut slots?

11 A. That's exactly right. And tells us something about the
12 situation of those cuts before they were made.

13 THE COURT: Sure. Okay. You can pick up.

14 MR. PACKIN: Thank you, Your Honor.

15 BY MR. PACKIN:

16 Q. You told us before what photogrammetry is. Was
17 photogrammetry used in this case?

18 A. Photogrammetry was used.

19 Q. For what purpose did you use it in this case? What did
20 you determine using photogrammetry, and then we'll go into how
21 you did it?

22 A. I determined, based on known dimensions of the pipes
23 themselves, as well as a reliable analytical technique, the
24 distance between the two pipes and the distance that each of
25 the pipes was above the ground.

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1 Q. Were these photographs the photographs you used for that
2 purpose?

3 A. Not the photograph on the right, but the photograph on the
4 left was the photograph used to determine the horizontal
5 distance between the two pipes.

6 Q. Have you prepared a slide --

7 THE COURT: Just a minute. The photo on the right -
8 - excuse me. We're talking about the left photo, the distance
9 shot, right?

10 A. Yes.

11 BY MR. PACKIN:

12 Q. But to make it simpler, did you prepare a slide showing
13 the photographs you used when you did your photogrammetric
14 analysis?

15 A. I did.

16 Q. Can we put that up please? Let me show it to counsel
17 first.

18 MR. WALSH: No objection.

19 BY MR. PACKIN:

20 Q. So let's put up as P-9 --

21 (Plaintiff's Exhibit-9 previously marked for
22 identification)

23 A. Is this the -- let me see which one you showed counsel.

24 MR. PACKIN: Below that. Nope.

25 A. Further along?

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1 MR. PACKIN: That's it.

2 BY MR. PACKIN:

3 Q. Are those two photographs -- first of all, for the Court's
4 purposes, the photo on the left is again photograph #31 in the
5 Court's packet. The photo on the right is photograph #32.

6 THE COURT: Okay, just a minute. I'll be right with
7 you. And P-9 is into evidence now.

8 (Plaintiff's Exhibit-9 admitted into evidence)

9 THE COURT: Thank you, Mr. Walsh. Shows two photos,
10 P-5(31) on left and P-5(38) did you say? 37?

11 MR. PACKIN: The second one is 32.

12 THE COURT: Oh, 32.

13 MR. PACKIN: 31 and 32 in your packet.

14 THE COURT: Okay. 32 on right. Okay.

15 BY MR. PACKIN:

16 Q. Using P-9, would you explain to us how you applied
17 photogrammetry to determine as is indicated on the slide the
18 distance between the pipes where they were being cut and the
19 height of each pipe from the ground at the location where they
20 were being cut?

21 A. Recalling that the definition of photogrammetry is
22 obtaining reliable dimensions from photographs, we simply took
23 advantage of the known dimensions of these pipes as 10 inches.

24 THE COURT: This is the exterior circumference --
25 exterior diameter?

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1 A. Yes. It is. Or just the diameter.

2 THE COURT: Exterior.

3 A. The diameter of the exterior of the pipe.

4 THE COURT: Pipe. Yes. Go ahead.

5 A. If that is 10 inches, we can scale using the -- and you're
6 going to have to help me with the number, but using the
7 photograph on the left, which is --

8 MR. PACKIN: 31.

9 A. -- P-5(31) --

10 THE COURT: Yes.

11 A. -- we can determine directly the distance between the two
12 pipes in the horizontal plane as 18 inches.

13 BY MR. PACKIN:

14 Q. And walk us through how that was done using
15 photogrammetry.

16 A. You simply take the photograph --

17 THE COURT: I'll be right with you. Just a minute.

18 A. You simply go into -- we used the software called
19 Photoshop. You count the number of pixels that cross the
20 diameter of the 10-inch pipe. You check that on the right-
21 hand side as well, and then you look at the distance between
22 the two pipes in terms of pixels, use your scale factor, and
23 back out the distance between the two.

24 THE COURT: So you know about the 10 inches, so you
25 can count those pixels, right?

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1 A. Exactly.

2 THE COURT: And that will give you a yardstick for
3 then measuring the distance between the two pipes?

4 A. Absolutely.

5 BY MR. PACKIN:

6 Q. And is that how that was done in this case?

7 A. That's how that was done in this case.

8 Q. Okay. What are the references on the top to Bauer 2007,
9 Haun 2010?

10 A. Those are simply photogrammetric references; one from our
11 own laboratory where we have used photogrammetry and published
12 in peer-reviewed journals. Haun is another photogrammetry
13 paper, and I have a general discussion of the accuracy,
14 validity, error rates associated with photogrammetry that I'm
15 happy to speak through or -- these are techniques that are
16 widely used in many, many fields ranging from microscopy to
17 scenery construction to motor vehicle crush damage
18 reconstruction.

19 THE COURT: Okay, thank you. Okay, so we've got the
20 18 inches there.

21 BY MR. PACKIN:

22 Q. So, using the pixel-counting method, you were able to
23 determine with the known diameter of the pipes the distance
24 between them?

25 A. Correct.

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1 THE COURT: You placed your transverse arrow between
2 the two pipes at a certain location along the length of those
3 two pipes. Is that the, as best you can determine, the
4 location of the incident?

5 A. It is. You can see the cut itself, and you can see a
6 small amount of distortion or buckling of the pipe that has
7 occurred in that location.

8 THE COURT: Which of those two pipes is the one that
9 has been partially cut as of the time of the incident?

10 A. The pipe on the right --

11 THE COURT: Okay. Let me just make a note of it.

12 A. -- in the left-hand photograph.

13 THE COURT: Thank you.

14 MR. PACKIN: Your Honor, for the Court's purposes,
15 in the larger version of photograph number 31 that's contained
16 in P-5, you'll be able to see the cut where the arrow was
17 placed.

18 THE COURT: That's fine. Just trying to get
19 oriented.

20 BY MR. PACKIN:

21 Q. Using the photograph on the right, which is P-5(32), can
22 you explain to us how using photogrammetry you determined the
23 height of each pipe from the ground at the location that the
24 pipe was being cut?

25 A. In the photograph on the right, we take advantage of

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1 additional information that was available, and that is that
2 this event occurred roughly at noontime, shortly thereafter,
3 and we have shadows from the sun that we can see in the scene.
4 And to orient the Court, we're now looking at this event from
5 the side where the first cut was made. The first kerf or open
6 kerf that we described earlier. It shows the position of the
7 sun. We again used the 10-inch diameter of the pipe and
8 measurements down to the edges of the shadow, along with
9 simple trigonometry to determine that distance. So we can
10 create a right triangle. We're trying to determine the
11 distance of the vertical part of that triangle, knowing
12 something about its hypotenuse. And we can thereby infer this
13 distance and the distance of the higher pipe.

14 THE COURT: Trigonometry or geometry?

15 A. Both.

16 THE COURT: Okay, both.

17 BY MR. PACKIN:

18 Q. And how is that calculation made? What is done? What was
19 done by you in this case?

20 A. We simply counted pixels again, and I have a slide that
21 can show the methodology of using the sun angle and the
22 calculations made from it, but it is truly nothing more than
23 knowing where the edge of the shadow is, knowing that it's
24 cast by a sun that is in a particular position or close to
25 that position, and then using what we can measure between the

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1 center of the pipe and the edge of the shadow to infer what we
2 need to know, which is the vertical distance from the
3 bottommost point on the pipe.

4 Q. And was there any -- strike that. You said you prepared a
5 slide that shows how you made the calculation in this case?

6 A. Yes.

7 Q. Could you put that slide up, and I'll show it to counsel?

8 MR. PACKIN: Can we mark that as P-10, Your Honor?

9 (Plaintiff's Exhibit-10 previously marked for
10 identification)

11 THE COURT: Sure. Mr. Walsh, any objections?

12 MR. WALSH: No objection.

13 THE COURT: Okay. Thank you very much. P-10 in
14 evidence. Slide showing how this vertical distance from the
15 ground was measured, right?

16 (Plaintiff's Exhibit-10 admitted into evidence)

17 A. It's background for it. It shows the angle of the sun
18 that we get from observatory data for that time of day.

19 BY MR. PACKIN:

20 Q. You've indicated the U.S. Naval Observatory data. Is that
21 what you consulted to reach that 51 degree angle?

22 A. Yes.

23 Q. Was that consistent with the times indicated in terms of
24 the incident reports and accident report? That it was midday?
25 Somewhere after noon?

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1 A. It was certainly midday. A little earlier than the police
2 and EMTs arrived on the scene, so we know it's an approximate
3 time.

4 Q. Explain to us -- walk us through how you -- knowing that
5 angle and the diameter of the pipes and the pixels you were
6 able to make the calculation as to the height of each pipe off
7 the ground?

8 A. So we know where the sun is. We know how a circular cross
9 section projects a shadow onto the ground. We can see those
10 shadows, and if we can measure -- if what we're interested in
11 is the distance from here down to the ground --

12 THE COURT: Namely, the uncut pipe?

13 A. Namely, the uncut -- either one, but --

14 THE COURT: All I'm say is when you say from here,
15 your experience tells you that doesn't translate for purposes
16 of a transcript.

17 A. You're absolutely right. From the center of either of the
18 two pipes down to the ground, we know and can see from the
19 photographs the positions of the edge of the shadow. We know,
20 again, the pixels for 10 inches. And we can -- and I have a
21 second slide that shows the triangles that are created.

22 MR. PACKIN: Show that please. I'll show it to
23 counsel. That would be P-11.

24 (Plaintiff's Exhibit-11 previously marked for
25 identification)

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1 A. Yes. And this --

2 THE COURT: Mr. Walsh, are you able to allow this
3 in?

4 MR. WALSH: I have no objection, Your Honor.

5 THE COURT: Thank you, sir. P-11 gives the
6 calculations, right?

7 A. Yes.

8 THE COURT: In evidence.

9 (Plaintiff's Exhibit-11 admitted into evidence)

10 A. And gives us the information as to the desired height,
11 what can be directly measured from the photograph, and then
12 the trigonometric relationship that we derived that tells us
13 how we get one from the other. It also --

14 THE COURT: I hope there won't be a quiz.

15 MR. PACKIN: (Laughs).

16 A. Yeah, right before your call. The -- we've also estimated
17 the error, and given its bounds, as less than 2 inches, and
18 ranges between 0% and 7%, depending on whether you're talking
19 about the distance of the pipe that's closest to the ground
20 and the pipe that's higher.

21 THE COURT: Now, you call this your error margin?

22 A. Yes.

23 THE COURT: For calculation?

24 A. And it's an attempt to maximize that.

25 THE COURT: Yes.

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1 A. And then we can provide the results on the figures that
2 have already been provided.

3 THE COURT: Which slide is this that you've just put
4 up?

5 MR. PACKIN: I'm going to show it to counsel. This
6 would be marked --

7 MR. WALSH: It's on the screen. I can see it.

8 MR. PACKIN: P-12. And that --

9 (Plaintiff's Exhibit-12 previously marked for
10 identification)

11 THE COURT: Any objection, Mr. Walsh?

12 MR. WALSH: No objection, Your Honor.

13 THE COURT: Thank you.

14 (Plaintiff's Exhibit-12 admitted into evidence)

15 MR. PACKIN: P-12, I believe, Your Honor, is #32 in
16 your packet with the derived measurements superimposed upon it
17 by Dr. Hayes.

18 BY MR. PACKIN:

19 Q. Is that accurate, sir?

20 A. That is.

21 Q. Okay.

22 THE COURT: And just what is the conclusion?

23 BY MR. PACKIN:

24 Q. What were your conclusions regarding the height of each
25 pipe off the ground?

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1 THE COURT: Can we say the cut pipe and the other
2 pipe?

3 MR. PACKIN: Very good.

4 A. Perfect.

5 BY MR. PACKIN:

6 Q. What was your conclusion as to the height from the ground
7 to the bottom of the pipe that Mr. McGee was cutting?

8 A. It was -- the bottom of that pipe to the ground was 10
9 inches.

10 Q. What was your conclusion as to the distance from the
11 bottom of the pipe he had not cut to the ground?

12 A. 22 inches.

13 Q. The pipe that was 22 inches from the ground, was that, to
14 your understanding, was that pipe behind him when the incident
15 initiated?

16 A. It was behind him when he was between the pipes and
17 performing the second of the two cuts, he was between the
18 pipes working on the inside of the lower of the two.

19 Q. And so you established a 12-inch height differential
20 between them, correct?

21 A. Correct.

22 Q. Now, was the calculated error range for what you concluded
23 here within tolerances that are considered acceptable in your
24 field of accident reconstruction and injury biomechanics?

25 A. Yes. To my understanding and background, training, and

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1 experience, especially given a situation where we have a human
2 body with soft tissue surfaces potentially interacting with
3 these pipes, these error bounds were well within what was
4 necessary to reliably characterize this scene.

5 THE COURT: Acceptable margin of error, right?

6 A. Yes.

7 THE COURT: Look at the ground underneath there. We
8 are in a landfill here. And we're digging trenches for these
9 pipes to go into, right?

10 A. Yes.

11 THE COURT: Did you make any assumption about
12 whether the surface of the ground under these 18-inch-apart
13 pipes was more or less level at exactly the point where you
14 were measuring their respective height from that ground?

15 A. We saw no evidence otherwise.

16 THE COURT: Okay, that's all --

17 A. We don't have --

18 THE COURT: -- I need to know.

19 BY MR. PACKIN:

20 Q. Now, when you say level, Dr. Hayes, are you talking about
21 level with a leveling device and the bubble is precisely
22 centered?

23 A. No. I'm talking about what I understood Her Honor's
24 question, is this roughly level, and --

25 THE COURT: Let me refine it a little better. I'm

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1 not asking about whether the ground is falling off along the
2 length of those pipes. That I'm not asking you.

3 A. I understand.

4 THE COURT: I am asking you whether if you go
5 transversely across the two pipes, and you're just measuring
6 the point underneath each pipe, whether there's any, you know,
7 difference in that vertical distance based upon a change in
8 the -- what do you call it? The lay of the land?

9 A. It is -- and I understood your question to be that.
10 Realize, however, that this entire reconstruction of the scene
11 is based on differences between local ground, as you described
12 it, and the pipe. Now, if -- in the transverse direction. If
13 I slightly tilt that -- I'm using my hands to recreate the
14 ground -- that's not going to influence my results, because
15 whether he's on a very small slope, that would just mean that
16 pipe is up a little higher, and so the entire scene moves with
17 the local slope of the ground.

18 THE COURT: Enough. Thank you.

19 BY MR. PACKIN:

20 Q. Now, having arrived at those calculations as to the height
21 of the pipes and the 18 inches between them, you told us
22 before that photogrammetry is a technology that's used in
23 fields other than injury biomechanics. Tell us what types of
24 situations and circumstances it's used and relied on?

25 THE COURT: Do you have a slide?

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1 A. I do --

2 MR. PACKIN: We do.

3 THE COURT: What have you numbered it, counsel?

4 BY MR. PACKIN:

5 Q. And I would like you to address the accuracy -- first give
6 us some examples of where it is used, and I'll show counsel
7 this first one.

8 MR. WALSH: I can see up there if that's what you're
9 using.

10 MR. PACKIN: Yes. We'll call that P-13.

11 (Plaintiff's Exhibit-13 previously marked for
12 identification)

13 MR. WALSH: Your Honor, I do think I have objections
14 as we get afield here. None of this was anything included
15 within his report. There was no discussion of fields using
16 photogrammetry. There were certainly no -- there's nothing in
17 the report that discusses anything like this, so we're outside
18 the scope of the report again.

19 THE COURT: Well, he's using the technique of
20 photogrammetry. I take this to be a demonstration of just
21 that this is a concept and a technique that is a recognized,
22 reliable technique. That's how I understand that.

23 MR. WALSH: We're not challenging the reliability of
24 it. We -- I accept at face value the spacing of the pipes as
25 he's found them.

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1 THE COURT: Oh, okay.

2 MR. PACKIN: Just for purposes of the record, I
3 would like to go through this very quickly, because he did,
4 indeed, discuss some of these very issues in uses and
5 applications of photogrammetry at his deposition when asked by
6 Mr. Walsh's associate. So if we could just briefly go through
7 it?

8 THE COURT: I will allow you this leeway. I am not
9 into making any rulings on admissibility for purposes of trial
10 should we get to that point.

11 MR. PACKIN: That's an understanding I think we
12 have.

13 THE COURT: All these hearing exhibits.

14 MR. PACKIN: Yes.

15 THE COURT: Okay, so you're allowed leeway.

16 MR. PACKIN: Thank you, Your Honor.

17 BY MR. PACKIN:

18 Q. Could you just briefly explain --

19 THE COURT: P-13 in evidence.

20 (Plaintiff's Exhibit-13 admitted into evidence)

21 BY MR. PACKIN:

22 Q. -- what P-13 demonstrates in terms of the examples of uses
23 of photogrammetry?

24 A. Simply this slide demonstrates techniques that are used in
25 motor vehicle collision reconstruction, crime scene

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1 reconstruction on the lower left. A second example, we do a
2 lot of work with surveillance videos.

3 MR. PACKIN: Before you proceed, that second example
4 we'll mark as P-14.

5 THE COURT: Same objection, same ruling.

6 (Plaintiff's Exhibit-14 marked for identification)

7 MR. WALSH: Your Honor, as long as there's -- as
8 long as we're understanding that this is simply for purposes
9 of this hearing and no rulings on admissibility at trial, I
10 really don't have any objection at all.

11 THE COURT: Thank you very much. So the first slide
12 that you showed had, I think, two motor vehicles and one
13 bedroom which you probably are going to say is a crime scene,
14 right?

15 A. It was a crime scene, yes.

16 BY MR. PACKIN:

17 Q. Would you go back to that slide, please?

18 A. Which? I am back at that slide.

19 Q. Oh, sorry.

20 THE COURT: He'll get there. So anyway, are we
21 going to do P-14 next and then go back and forth?

22 MR. PACKIN: Yes. P-14 is next.

23 THE COURT: Okay, P-14 in evidence.

24 (Plaintiff's Exhibit-14 admitted into evidence)

25 BY MR. PACKIN:

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1 Q. On P-13, just briefly, the references underneath Randalls
2 2010, Gonzalez Aguilar 2008, Mills 2005, what do they refer
3 to, sir?

4 A. They simply refer to peer reviewed publications where
5 these techniques have been used.

6 Q. So these three images that you've extracted and placed
7 upon this P-13 reflect images taken from peer reviewed studies
8 analyzing the reliability of photogrammetry?

9 A. Use and reliability, yes.

10 Q. Thank you. And going back to that for just one second,
11 what's the image on the upper right that appears to be a
12 graph?

13 A. That is a comparison between direct measurement of the
14 crush that we see on the car on the upper left, one done by
15 photogrammetry based solely on photographs, and the second
16 done by direct hand measurement by human beings and machines.

17 Q. And in that study, what was the conclusion as to which was
18 more accurate, the photogrammetric measurement or the human
19 measurement?

20 A. Actually, the photogrammetric measurement was more
21 accurate and reliable.

22 Q. Okay. And now to P-14, please. What examples of
23 photogrammetry are we seeing in those five images -- actually
24 six images.

25 A. We are seeing in the upper left and lower right images

Hayes - Direct

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1 from surveillance video of a murder scene showing how the
2 height of the person can be determined in ways very comparable
3 to what we used here. Every time our eyes are scanned in
4 order to base identification on, we use applications of
5 photogrammetry. And the bottom left is a published paper from
6 our laboratory using cross sectional MRI, or magnetic
7 resonance images, to determine distances and areas in a
8 medical application.

9 THE COURT: In brain?

10 A. It's actually on the -- that's the thigh.

11 THE COURT: Oh, okay. Right.

12 A. So it's a cross section of the thigh.

13 THE COURT: In human thigh, right?

14 A. Yes.

15 THE COURT: And what's the last one?

16 A. The last one goes with the upper left. It was a way to
17 calibrate the scene, the murder scene, that's shown in the
18 upper left.

19 THE COURT: And the two eyes staring at us?

20 A. The two eyes is the Hahn paper that is based on a
21 comparison of photogrammetry and anthropometry in a study of
22 facial features.

23 THE COURT: Measured in anthropology?

24 A. Anthropometry.

25 THE COURT: What is anthropometry?

Hayes - Direct

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1 A. That's the study of human size and shape that we were
2 talking about earlier this morning.

3 THE COURT: Oh, okay. I thought it was --

4 A. I'm sorry.

5 THE COURT: Because the -- I thought that the face
6 itself was being studied, but the features of the face are
7 included in the study of human size and shape.

8 A. They are, exactly.

9 THE COURT: Okay. When you said size and shape, I
10 was just thinking of, you know, the body itself, not the
11 features of it. Now I understand anthropometry better.

12 BY MR. PACKIN:

13 Q. The references underneath those four sets of images, Russ,
14 Hahn, Bauer, and Russ, what do they refer to?

15 A. They refer again to peer reviewed publications or
16 publications where they have been used and validated and show
17 a range of applications for the technique.

18 Q. Who's Bauer?

19 A. Dr. Jeremy Bauer is a Ph.D. -- has a PhD. from Oregon
20 State in biomechanics. He works in my office, does most of
21 our image processing and photogrammetry in a wide variety of
22 cases.

23 THE COURT: Tell me again his name.

24 A. Jeremy Bauer, B-A-U-E-R, PhD.

25 BY MR. PACKIN:

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1 Q. And he is the author of this peer reviewed publication on
2 P-14?

3 A. He's the first author. I think I'm the senior or last
4 author.

5 Q. So you published a peer reviewed article on the use and
6 accuracy of photogrammetry, is that correct?

7 A. We did.

8 Q. And did Mr. Bauer participate in the photogrammetric
9 analysis that was done in this case?

10 A. He did under my direction, supervision, and control.

11 THE COURT: He did the photogrammetry for your
12 report in this case? Yes?

13 A. Yes.

14 THE COURT: Under your supervision and control.

15 A. Yes.

16 BY MR. PACKIN:

17 Q. Now, I believe you prepared two other slides depicting the
18 cover sheets of some peer reviewed articles on the accuracy of
19 photogrammetry, is that correct?

20 A. Yes.

21 MR. PACKIN: Let's call that P -- is it 16?

22 THE COURT: We are at 15 now, by my count.

23 MR. PACKIN: P-15?

24 THE COURT: Yes, please.

25 (Plaintiff's Exhibit-15 marked for identification)

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1 BY MR. PACKIN:

2 Q. What is that?

3 A. This is a paper that was the source of the graph that you
4 asked me to describe talking about comparing photogrammetric
5 versus direct measurement, basically coming to the conclusion
6 that photogrammetry was accurate and reliable for determining
7 crush of vehicles, a task that's considerably more complex
8 than the photogrammetric technique that we used here.

9 Q. Is that a peer reviewed publication?

10 A. Yes.

11 MR. PACKIN: And you have another slide which I'd
12 ask be marked P-16.

13 (Plaintiff's Exhibit-16 marked for identification)

14 THE COURT: You haven't introduced P-15.

15 MR. PACKIN: I'm sorry. I would offer the prior one
16 as P-15.

17 THE COURT: Any objection?

18 MR. WALSH: No objection, Your Honor.

19 (Plaintiff's Exhibit-15 admitted into evidence)

20 THE COURT: Okay, P-15 is a slide simply showing the
21 cover page of the paper.

22 MR. PACKIN: Yes.

23 BY MR. PACKIN:

24 Q. And as a matter of fact, if we could go back, Dr. Hayes,
25 just so the record is clear, it's titled "Semi-Automated Crush

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1 Determination Using Coated and Non-Coated Targets With Close
2 Range Photogrammetry." And the next one, which I would offer
3 as P-16, which counsel has indicated no objection, is "The
4 Accuracy of Photogrammetry Versus Hands On Measurement
5 Techniques Used in Accident Reconstruction." Could you tell
6 us generally what that article addressed?

7 MR. WALSH: Before you start, one clarification.
8 Obviously my lack of objection is based on the prior statement
9 that we're making no rulings on the admissibility.

10 MR. PACKIN: That will be understood.

11 THE COURT: That's a continuing understanding.

12 MR. PACKIN: That will be understood throughout.

13 (Plaintiff's Exhibit-16 admitted into evidence)

14 A. And this is similarly a comparison of direct measurement
15 and photogrammetry in the field of crush determination in
16 motor vehicle collision analysis.

17 BY MR. PACKIN:

18 Q. And finally, Dr. Hayes, there's one other slide you
19 prepared from one of the images that we've already had on the
20 screen where you've shown the spacing between the two 10-inch
21 pipes, and just for sake of completeness, let's put that up
22 and mark that one as well. You showed the one with the height
23 off the ground, but this one is the spacing between them.
24 There we go.

25 MR. PACKIN: And I would ask that that be marked.

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1 That's in Your Honor's packet as P-5(31), but with the
2 measurements superimposed showing the 18-inch determination
3 between the two pipes and the 10-inch diameter of each pipe.

4 (Plaintiff's Exhibit-17 marked for identification)

5 THE COURT: Any objection?

6 MR. WALSH: No objection.

7 THE COURT: Thank you, sir. P-17 admitted.

8 (Plaintiff's Exhibit-17 admitted into evidence)

9 BY MR. PACKIN:

10 Q. I take it from these peer reviewed articles,
11 photogrammetry then has been tested and subjected to peer
12 review and publication.

13 A. It has.

14 Q. Have there been assessments of the rate of error or
15 inaccuracy in this methodology?

16 A. Most of these papers directly confront that issue of
17 validity and reliability. Its error rates are known, error
18 rates related to mapping and many scene reconstructions.
19 There are standards for such measurements, and it's broadly
20 accepted within the scientific community and obviously used
21 outside of litigation.

22 Q. And I believe you testified it's also used in criminal
23 matters, as you've shown in some of these slides?

24 A. It is, and as I have used it as well.

25 Q. And in this particular case you have already --

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1 THE COURT: So it's broadly accepted in science and
2 forensic science? Is that what you're saying?

3 A. Yes, exactly. Exactly right. I've testified on the basis
4 of photogrammetric reconstruction of cliffs that people have
5 been thrown over, for example.

6 BY MR. PACKIN:

7 Q. And in this case you did, as you already told us, specific
8 error calculations that are specific to this case and
9 concluded that the range of error was within the acceptable
10 range in your field, correct?

11 A. Yes.

12 THE COURT: And of course always we're dealing with
13 a still photo, right?

14 A. We are.

15 THE COURT: It sits still on the page for you to
16 measure something.

17 A. Or sits still on the screen so we can use pixels, yes.

18 THE COURT: Right.

19 BY MR. PACKIN:

20 Q. Are there standards controlling the application of
21 photogrammetry to a given scenario?

22 A. Yes.

23 Q. Who publishes those standards?

24 A. They are published in part, and I have not made a
25 comprehensive review of all of these standards, but the

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1 American Society for Photogrammetry and Remote Sensing has a
2 standards committee that in fact deals with photogrammetric
3 standards.

4 Q. On how many occasions in your practice have you used
5 photogrammetry for one purpose or another?

6 A. Many scores, so I would say well over 100 perhaps. That's
7 a hard estimate to make. But I've used it many, many times.

8 Q. And in using it and performing error calculations and
9 applying your results have you found it to be accurate,
10 reliable, and consistent?

11 A. I have.

12 Q. Now, you mentioned also that you use -- so you use the
13 photogrammetry to determine the relative heights of the two
14 pipes involved and the distance between, correct?

15 A. Yes.

16 Q. And you had certain other information that was a known,
17 like the 10-inch diameter of the pipes, correct?

18 A. Yes.

19 Q. You mentioned before that you used in this case
20 anthropometry as well.

21 A. I did.

22 Q. For what purpose did you use anthropometry to address the
23 first of the three questions that was posed to you?

24 THE COURT: Just a second. Counsel, since we're
25 switching to the next technique, I suggest we give ourselves a

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1 very brief lunch recess now.

2 MR. PACKIN: That sounds fine.

3 MR. WALSH: Your Honor, may I inquire as to what the
4 timing of this is because -- I mean, how much longer is Mr.
5 Packin --

6 THE COURT: Yes, you may.

7 MR. WALSH: -- going to be going and how much time
8 will we have left?

9 MR. PACKIN: I'm estimating, since we covered a fair
10 amount, maybe an hour, or a little longer maybe.

11 THE COURT: Okay. Mr. Walsh, once you've heard it
12 all you can make your bid for how much time you think you
13 need.

14 MR. WALSH: Thank you.

15 MR. PACKIN: Should we return at 1:30, Your Honor?

16 THE COURT: If you're back in half an hour, we can
17 get started even before that.

18 MR. PACKIN: Thank you. Will the Courtroom be open
19 during the break?

20 THE COURT: Yes.

21 MR. PACKIN: Thank you.

22 (Court in recess)

23 THE COURT: Thank you. Back in session. You may
24 proceed.

25 MR. PACKIN: Thank you, Your Honor.

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1 DIRECT EXAMINATION (CONT'D)

2 BY MR. PACKIN:

3 Q. Doctor Hayes, when we left off, you told us what
4 anthropometry is. Did you use anthropometry in this case in
5 addressing Question 1?

6 A. Yes. If we characterize Question 1 as could he fit, and
7 on the basis of the work that I've already described knowing
8 where the pipes were, the question is whether we can, using a
9 reflection of a human being of known -- of his size and shape,
10 whether it can be positioned within those pipes such that it
11 can be balanced, his words were "set and steady."

12 Q. Okay. And was part of your consideration in that regard
13 in whether the incident would produce injuries that fit the
14 signature of the injuries in this case?

15 THE COURT: What was that?

16 BY MR. PACKIN:

17 Q. And was part of your analysis from the anthropometric
18 standpoint to determine whether that positioning could result
19 in injuries that fit the signature of the injuries in this
20 case?

21 A. Yes. If the positioning that's found -- it has to produce
22 those injuries.

23 Q. Now, what data did you use or rely on in applying
24 anthropometry in this case?

25 A. We had from the medical records that Mr. McGee was 5'9"

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1 tall, that he weighed 181 pounds, according to the medical
2 record. His testimony was 175. And based on very large
3 databases of various kind, figured out the size and shape of
4 his particular body.

5 Q. Okay.

6 THE COURT: His particular?

7 A. Body.

8 THE COURT: Body.

9 BY MR. PACKIN:

10 Q. Did you have any body mass index for him as well?

11 A. Yes, his body mass index, as I recall, was close to 27.

12 Q. What does that indicate, a BMI of 27?

13 A. Well, we start getting into an obese range of 30 and 35,
14 morbidly obese above 40. But the real key here is that he's
15 about a 50th percentile male, and that would comport with his
16 height, his weight, and his BMI.

17 Q. Now, what did you do, or how did you apply that
18 anthropomorphic --

19 THE COURT: So he was --

20 MR. PACKIN: Sorry.

21 THE COURT: His BMI was consistent with a relatively
22 fit individual of his size and weight?

23 A. Yes.

24 THE COURT: Is that right?

25 A. A 50% U.S. American male, 50th percentile meaning, you

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1 know, someone of --

2 THE COURT: Right.

3 A. -- normal height and weight is 175 pounds and between 5'9"
4 and 5'10", and that's just where he was.

5 BY MR. PACKIN:

6 Q. Now, how did you apply the anthropometric data in this
7 case to address Question 1?

8 A. I created a model of his size and shape and then used an
9 anthropometric program called HumanCAD, all one word, last
10 three letters capitalized, C-A-D, model, which is one of many
11 anthropometric models available and we have used, to position
12 him between the two pipes such that he could be stable, such
13 that his position could comport with the testimony that he
14 provided and, thirdly, would produce the injuries sustained.

15 THE COURT: Would, one, render him set and steady,
16 right?

17 A. Yes. His testimony was that he didn't start the cut down.
18 He was, I think his words were, "set and steady."

19 THE COURT: And two would be consistent with the
20 pipe environment, pipe positions?

21 A. Would fit between the pipe in a set and steady manner,
22 could produce the cuts.

23 THE COURT: And three, could produce the injuries.

24 A. And finally could produce the injuries based on physics.

25 BY MR. PACKIN:

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1 Q. And when you use an anthropometric model -- strike that.
2 Did that come into play at all with the photogrammetric
3 determinations that you made?

4 A. Yes. The positioning in the environment was created with
5 the photogrammetry. We created the cross sections of the
6 pipes in three dimensions, and then placed the model within
7 those two -- between those two pipes corresponding with the
8 second cut.

9 Q. Okay. And did you produce in your report a graphic
10 representation of how you did that in combination with
11 photogrammetrics and anthropometrics?

12 A. Yes. Figure 3 of my first report is one view of his
13 positioning, along with a scale diagram of the saw and of the
14 pipes at the distances off the ground that we determined in
15 step 1.

16 Q. All right. Now, you have a slide which includes that
17 image, correct?

18 A. I do.

19 MR. PACKIN: Can you put that up, please, and we'll
20 ask to mark that as P --

21 THE COURT: 18.

22 MR. PACKIN: -- 18.

23 (Plaintiff's Exhibit-18 marked for identification)

24 BY MR. PACKIN:

25 Q. In that P-18, is the image on the left a reproduction of

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1 Figure 3 from your report?

2 A. It is.

3 Q. And what -- walk us through, first of all, how is that
4 I'll call it spider web type representation of the --

5 THE COURT: Are you offering this in evidence?

6 MR. PACKIN: Yes.

7 MR. WALSH: Your Honor, I have never seen the one on
8 the right. I don't know where that came from. It's certainly
9 not something that's in the report, so I don't know what that
10 is. I have no objection to the one that is in the report on
11 the left.

12 THE COURT: You know, if you want to be formal about
13 this, we shall obtain some foundation testimony about what's
14 on the right.

15 MR. WALSH: Well, I would prefer to know what we're
16 looking at before --

17 THE COURT: That's fine. Okay, foundation
18 testimony.

19 BY MR. PACKIN:

20 Q. Dr. Hayes, what is the --

21 THE COURT: Let's hear about the item on the right.

22 BY MR. PACKIN:

23 Q. What's depicted on the right, the image on the right?

24 A. The right is simply a shaded view of the image on the left
25 shown in a different format. The one on the left is just one

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1 of the means we have to represent these figures that shows the
2 margins and the elements that are used to create the surface.
3 The one on the right simply is colored, is in exactly the same
4 position but is seen from a different viewpoint.

5 THE COURT: It's also seen from a different angle
6 without the reference points of the two pipes.

7 A. Correct.

8 THE COURT: Do you want to inquire, Mr. Walsh?

9 MR. WALSH: No, I'm just -- I am concerned about
10 that because I cannot tell if that figure is in the same
11 position because, as you say, the reference points are gone.
12 And I think these reference points are going to be pretty
13 important as we progress through this hearing. I'm just not
14 sure what that figure represents.

15 MR. PACKIN: Can I ask some questions further --

16 THE COURT: Dr. Hayes, there is a cube in front of
17 this colored-in figure on the right side.

18 A. Yes.

19 THE COURT: What is that cube there for?

20 A. That cube represents the -- or produces the center of
21 gravity of the saw and the contact points of the two hands.
22 And so the saw runs between the two hands that you can see on
23 both images. It's just as if we're looking at it from the
24 back as opposed to from a side view, and is one of the
25 representations provided by the software.

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1 BY MR. PACKIN:

2 Q. How, Dr. Hayes, do you --

3 THE COURT: Just a minute. There are red arrows
4 extending downward from the hands depicted on the model on the
5 right.

6 A. Yes.

7 THE COURT: Are those red arrows supposed to be
8 something about the saw or are they measurements?

9 A. No, those arrows are the forces assumed on his hands from
10 the saw. So the gravitational attraction of the saw to the
11 center of the earth occurs at the center of gravity between
12 the two handles, and he's got one hand on the front handle, as
13 was described in the testimony, and his right hand on the rear
14 handle.

15 THE COURT: With the gravity pulling straight down?

16 A. Yes. And if I have a, let's say as a rough estimate, a 25
17 pound saw, what is assumed here is that half of that goes
18 through the front end and half of it goes through the back.

19 BY MR. PACKIN:

20 Q. How do you know from the generation of this image that the
21 body positioning in the right image is the same identical to
22 the left image?

23 A. Because they were taken from exactly the same set. We get
24 a three dimensional view that we can look from the top down,
25 from the side, from any angle we would like, and this is, I'm

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1 testifying, just the same image with different colors.

2 THE COURT: Anyway, if it's the same image, on the
3 right you've got a person wearing a white shirt and blue
4 trousers and some shoes of some sort. That much we can see
5 corresponding to the figure, the model on the left.

6 A. Yes.

7 THE COURT: Okay. But what about the cube and the
8 two red arrows, which are the things that are added on the
9 right side? How do we get those?

10 A. Those come from a mathematical representation that
11 reflects the position of the saw that you see on the left with
12 weight equally distributed between the two hands.

13 THE COURT: Do those two red arrows come from the
14 same program that created the image on the left, or is it a
15 further calculation done in your office?

16 A. No, it is -- well, it comes through the same software.
17 The calculation is simply dividing the weight of the saw by
18 two, one for each hand.

19 MR. WALSH: All right, for purposes of this hearing
20 I don't have any objection, Your Honor. I'll withdraw any
21 objections.

22 THE COURT: Okay, fine. Thank you very much,
23 Counsel. P-18 in evidence for this hearing.

24 (Plaintiff's Exhibit-18 admitted into evidence)

25 BY MR. PACKIN:

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1 Q. And Dr. Hayes, would you explain to us what we're seeing
2 in the image on the left? We have these what I call spider-
3 like human form because he's got the web type of things over
4 him. Where did that come from?

5 A. That comes from the same -- it used to be called
6 MannequinPRO. It is now called HumanCAD. It is a three-
7 dimensional anthropometric representation program that divides
8 body height and weight into different segment parts based on
9 large population studies, and then allows you to position that
10 figure in space in a way that is representative of the
11 anatomy. In other words, it would not allow you to backwardly
12 bend your knee beyond range of motion of the human knee. It
13 allows you to determine balance, whether the resultant force
14 on your body is between the feet, for instance, and allows you
15 to position other features in space in proximity to the model.

16 Q. Now, there are two circles, one behind the image's right
17 forearm and one in front of the image's left shin. Do you see
18 those two circles?

19 A. I do.

20 Q. What are they representing?

21 A. Those represent the outer circumference, the same 10-inch
22 diameter that we talked about earlier, of the pipes and are to
23 scale.

24 Q. Oh, that was to be my -- they are to scale in reference to
25 the individual and the saw?

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1 A. Yes.

2 Q. And are they --

3 A. And the ground.

4 Q. That was my next. Are they appropriately oriented in
5 terms of their relative heights off the ground and to each
6 other?

7 A. Yes.

8 Q. Are they spaced apart proportioned or scaled to the 18
9 inches?

10 A. They are.

11 Q. What is represented by the red outlined device that the
12 model is holding?

13 A. That is the saw in cross section that is taken as
14 perpendicular to the lower or the pipe that Mr. McGee was
15 cutting and was injured on.

16 Q. Is the saw represented in the image in scale in relation
17 to the individual and the pipes?

18 A. It is.

19 Q. Now, how did you do that? What data did you have
20 regarding the saw?

21 A. I had both photographs of the saw, as well as information
22 on saw weight, on saw length, saw width from both photographic
23 evidence and from the --

24 THE COURT: Specs? Specifications also, right?

25 A. Thank you. From specifications taken from the website.

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1 BY MR. PACKIN:

2 Q. And when you say photographic evidence, did you do any
3 photogrammetric measurements of the saw?

4 A. I did not.

5 Q. And why was that?

6 A. Because I had accurate measurements directly from the saw.

7 Q. Now, if you --

8 THE COURT: You measured the actual saw?

9 A. No, I --

10 THE COURT: You got it from the record that you
11 reviewed?

12 A. Yes.

13 BY MR. PACKIN:

14 Q. Now, you have a slide that you've created showing how you
15 created the anthropometric model of the individual not placed
16 between the pipes, correct?

17 A. This one?

18 Q. Yes.

19 MR. PACKIN: I'd offer that as P-19.

20 (Plaintiff's Exhibit-19 marked for identification)

21 BY MR. PACKIN:

22 Q. Can you just explain to us briefly what that represents?

23 THE COURT: All right, okay, P-19, is that all
24 right, Mr. Walsh?

25 MR. WALSH: No objection for purposes of this

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1 hearing, Your Honor.

2 THE COURT: P-19 is a slide showing a figure
3 standing facing height location, right?

4 A. Yes.

5 THE COURT: Okay.

6 (Plaintiff's Exhibit-19 admitted into evidence)

7 A. And you could qualify that by a wire frame figure, just to
8 distinguish it from the colored in shaded version.

9 BY MR. PACKIN:

10 Q. Okay, and what are you demonstrating in that slide?

11 A. Just to make the point that we take a representative
12 figure for Mr. McGee, put him within the pipes, and determine
13 whether the cuts can be made and whether he can be set and
14 steady or suitably balanced.

15 Q. Now, tell us the process of placing that figure, if you go
16 back to P-18 or ahead, tell us the process that's involved in
17 placing the figure between the pipes and holding the saw and
18 then making the determination as to whether the individual
19 fit, whether the individual could be properly balanced, and
20 whether the individual could complete the cut and sustain the
21 resulting injuries with the signature pattern. How do you go
22 about doing that, or did you go about in this case?

23 A. You simply take the figure and can move -- you grab onto a
24 knee for instance, or you grab onto the center, you move him
25 to between the pipes. You then bend him over, position his

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1 knees in space, bend his knee to a suitable range until he
2 fits between the two. You add, then, the saw both in
3 representative outline as you see here and its analog in the
4 physics of the weight of the saw. And then the program
5 basically calculates the center of gravity of the entire
6 system, human and saw, and indicates whether he can be
7 balanced. And it also helps tell us if he might be leaning or
8 contacting one or both of the pipes.

9 Q. Now, so the CAD program was given his body weight?

10 A. It was given his body weight, yes, and his height.

11 Q. And was it given the weight of the machine?

12 A. Yes.

13 Q. And then it yielded some calculation as to center of
14 gravity and balance?

15 A. Yes.

16 Q. Was your first positioning of him the one you went with,
17 so to speak, or did it require adjustments and modifications
18 of positioning until you were able to arrive at a position
19 that met those several parameters?

20 A. It is, as you suggested, an iterative process in that you
21 can't just position him there and you have to move him in
22 order to, in a sense, align the cuts made on the pipe with the
23 injuries that were sustained to the face and neck.

24 Q. Okay.

25 A. So short answer, no, we moved him around until he could

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1 fit comfortably, until he was sufficiently balanced that only
2 a small force was being exerted against one of the pipes, and
3 that was essentially the process.

4 Q. All right. And then I take it there was some evaluation
5 made as to whether that positioning could result in injuries
6 that fit the signature, is that correct?

7 A. Yes, if you have the face and neck directly above this
8 process, you can see that it produces the injuries.

9 Q. So there were iterative positionings of this model in that
10 space between the pipes that were rejected as not fitting
11 those various criteria, correct?

12 A. Yes, and much of it is not all that complicated. If his
13 knee is, for instance, being shown as within the pipe, that
14 obviously violates constraints on reality, and we have to make
15 him positioned in such a way that he does fit.

16 THE COURT: So you can't stuff him in there, right?

17 A. I can't stuff him in there such that he violates the outer
18 integrity of the pipe, for instance.

19 THE COURT: So you can't force a fit such that it
20 violates the other constants?

21 A. The integrity of the environment.

22 BY MR. PACKIN:

23 Q. So if I understand correctly, Dr. Hayes, it is possible
24 that using this program, together with the photogrammetric
25 conclusions that you reached, that it could have been possible

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1 that Mr. McGee could not have fit in between the pipes,
2 correct? That was one possibility.

3 A. Yes. If I'm understanding your double negative correctly,
4 yes, this could have come out that he couldn't fit and
5 couldn't achieve a balanced, or what he called a set and
6 steady, position before he initiated the second set of cuts.

7 Q. Okay. And it could have come out that he could fit and
8 could get balance but would not have enough room to make the
9 cut, correct?

10 A. That too.

11 Q. And finally, that he could have had all those criteria met
12 but not be able to produce the injury signature that was
13 involved here, correct?

14 A. Also correct.

15 Q. Were you able, using the photogrammetric analysis, the
16 anthropometry through the HumanCAD program, and applying your
17 education, training, and experience in injury biomechanics,
18 were you able to reach a conclusion to a reasonable degree of
19 biometric -- biomechanical, rather, and engineering certainty
20 as to what was the most likely position of Mr. McGee at the
21 time this event initiated?

22 A. I believe to a reasonable degree of engineering and
23 biomechanical certainty that this, or close to this, is the
24 most likely position that met all the constraints of the case
25 or the facts of the case.

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1 Q. And those --

2 THE COURT: Figure 3 is the what? Best or closest
3 to the best, right?

4 A. Yes.

5 THE COURT: Best what?

6 A. The representation --

7 THE COURT: Yes, representation.

8 A. -- of his position when his injury occurred.

9 BY MR. PACKIN:

10 Q. Did that positioning comport with his height and weight
11 and relative size and positioning of the pipes?

12 A. Yes.

13 Q. Did it, from the HumanCAD program, produce a result
14 indicating that he could have appropriate balance?

15 A. Yes, along with a small addition to balance by his hip or
16 back to the upper pipe.

17 THE COURT: Hip or back slightly raised?

18 A. Slightly in contact with the upper pipe, with the pipe
19 behind him.

20 THE COURT: In contact with second pipe is part of
21 that figure, right?

22 A. Yes.

23 BY MR. PACKIN:

24 Q. The CAD program itself gives you feedback as to balance?

25 A. Yes.

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1 Q. And did it comport with the cut that was being made on the
2 inner side of the pipe as shown in the photographic evidence
3 from the accident scene?

4 A. Yes. It was made to be constrained to a vertical cut or
5 approximately vertical cut through the pipe, what we've called
6 in here the second cut.

7 Q. Now, what is the -- who is the manufacturer of the
8 HumanCAD program?

9 A. NexGen, that's one word, N-E-X capital G-E-N, Ergonomics.

10 THE COURT: It's available on the open market?

11 A. It is.

12 BY MR. PACKIN:

13 Q. Now, in reaching your conclusion that this was the most
14 likely or close to most likely positioning of Mr. McGee at the
15 time the incident was initiated, you relied on this HumanCAD
16 program, correct?

17 A. Yes.

18 Q. Is HumanCAD -- and was there a certain iteration of this
19 HumanCAD program? You know how we get the iPhone 3, iPhone 4,
20 iPhone 5?

21 A. Yes, there was an iteration of HumanCAD, it was 1.1, but
22 this had a long history and differently named programs. It
23 used to be called MannequinPRO, all one word with the last
24 three letters, P-R-O, capitalized. So that program had been
25 around for a decade or so.

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1 Q. Is HumanCAD a technology that is used in injury
2 biomechanics in accident reconstruction?

3 A. It is, yes.

4 Q. And is it a technology that is generally accepted in the
5 field of injury biomechanics and accident reconstruction as
6 being reliable?

7 A. Yes, both from the perspective of the program itself, as
8 well as the general use of digital modeling of humans to
9 design environments for humans to interact with machines or
10 environments.

11 Q. Did you bring with you a slide or slides of some examples
12 of how HumanCAD is used to create and position models?

13 A. Yes.

14 THE COURT: You're marking a slide?

15 MR. PACKIN: Yes, as soon as I locate it online. I
16 would offer this slide as P-20, obviously subject to the same
17 conditions as counsel has iterated before.

18 MR. WALSH: I'm sorry?

19 MR. PACKIN: P-20.

20 MR. WALSH: Again, for the purposes of this hearing
21 I have no objection.

22 THE COURT: Thank you, Counsel. P-20 in evidence.

23 (Plaintiff's Exhibit-20 marked for identification)

24 (Plaintiff's Exhibit-20 admitted into evidence)

25 BY MR. PACKIN:

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1 Q. What does P-20 show, Dr. Hayes?

2 A. These are some examples of fits that have been tested,
3 published in the peer reviewed literature. The upper left is
4 the use of these kinds of digital anthropometric modeling to
5 design a helicopter cockpit. The picture in the upper right
6 is a set of working positions determined with the same kind of
7 software. The third example is an example of the use of
8 anthropometric models to meet the constraints of the Federal
9 Motor Vehicle Safety Codes in the design of trucks, a study of
10 a person's ability to reach the sun visor, to reach the
11 various controls, to get down out of the truck cab and be
12 balanced with the three point stance.

13 THE COURT: What's the upper right item?

14 A. That's a gentleman crawling in a narrow enclosure to
15 perform work in two positions.

16 THE COURT: Yes.

17 BY MR. PACKIN:

18 Q. And these images have, underneath them, indications of a
19 name and date; Porter, 1995; McDaniel, 1990; Bowman, 2001.
20 What do they represent, Dr. Hayes?

21 A. They represent peer reviewed publications, copies of which
22 I have with me, that demonstrate use of these in peer reviewed
23 publications outside of litigation.

24 Q. Okay. And do those years reflect that this was being used
25 as far back as 1990?

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1 A. It was used long before that, but yes, these techniques
2 were used for decades.

3 Q. And these are headed "Space Balance Examples." Could you
4 explain what that means?

5 A. I meant space just to reflect constrained space, or tight
6 fits, or to characterize the fit of a person in an environment
7 and to characterize them.

8 Q. Did you bring a slide or slides of additional examples of
9 use of HumanCAD to position models in space?

10 A. I did.

11 MR. PACKIN: And I'd offer this one as P-21, subject
12 to the same conditions, qualifications.

13 (Plaintiff's Exhibit-21 marked for identification)

14 BY MR. PACKIN:

15 Q. What is shown in that?

16 THE COURT: The same offer?

17 MR. PACKIN: Yes, Ma'am.

18 THE COURT: Same ruling, P-21 in evidence. Thank
19 you.

20 (Plaintiff's Exhibit-21 admitted into evidence)

21 A. So every time we sit at a desk, every time we sit in a
22 vehicle, every time we work on a machine in an assembly line
23 or a manufacturing facility, when we ride a motorcycle or a
24 three-wheeled conveyance that we see there, or every time you
25 sit at a desk at an ergonomic -- at a work station in front of

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1 the computer, you are taking advantage of these kinds of
2 anthropometric and ergonomic analysis techniques.

3 BY MR. PACKIN:

4 Q. And what are the references under each of those set of
5 pictures with a name and a date?

6 A. These are, again, peer reviewed publications with figures
7 taken from those particular publications.

8 Q. And do you have another slide, sir?

9 MR. PACKIN: We offer that subject to the same
10 limitations as P-22.

11 (Plaintiff's Exhibit-22 marked for identification)

12 MR. WALSH: No objection.

13 THE COURT: Thank you. P-22 in evidence.

14 (Plaintiff's Exhibit-22 admitted into evidence)

15 BY MR. PACKIN:

16 Q. What is shown in P-22, Dr. Hayes?

17 A. A helicopter example, a work station example, a grocery
18 checkout counter example to reduce the stresses on workers at
19 checkout stands, chairs, if you have an ergonomic chair, those
20 are based on anthropometry. Every bus that travels, every
21 school bus are all reflective of fitting people to their work
22 or transportation environment.

23 Q. What are the names and dates under each of those images on
24 P-22?

25 A. Same as the others.

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1 Q. Peer reviewed references?

2 A. Peer reviewed publications, yes, or chapters, in some
3 instances.

4 Q. Did you bring any slides --

5 THE COURT: Now, anthropometry, would the people
6 writing these articles and presenting these illustrations use
7 the term anthropometry or might they use other terms
8 interchangeably? Ergonomics?

9 A. Perfect. They would use ergonomics and anthropometry as a
10 subset of ergonomics. So to do ergonomics, we have to have
11 the environment, like our pipes, and then to do the fit we
12 have to have the anthropometry.

13 THE COURT: Okay.

14 A. And so there are international standards for ergonomics
15 that include subsections on anthropometry and biomechanics,
16 for instance.

17 THE COURT: These figures involve ergonomics and
18 anthropometry, right?

19 A. Yes.

20 BY MR. PACKIN:

21 Q. Did you bring slides reflecting publications regarding the
22 accuracy of the anthropometric modeling program?

23 A. Yes.

24 MR. PACKIN: I'll offer this as P-23, subject to the
25 same limitations.

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1 (Plaintiff's Exhibit-23 marked for identification)

2 MR. WALSH: And subject to the same limitations, I
3 have no objection.

4 (Plaintiff's Exhibit-23 admitted into evidence)

5 THE COURT: This excerpt of article --

6 MR. PACKIN: It's an article called "Verification
7 and Validation of Human Modeling Systems."

8 BY MR. PACKIN:

9 Q. Can you tell us briefly what this reflects, Doctor,
10 please?

11 A. These are a series of reach measurements that have been
12 obtained using anthropometric models and then tested for
13 accuracy and repeatability in direct studies with humans
14 asking the question, "Can you reach from here?" and the answer
15 is basically yes to a high degree of reliability.

16 Q. Does that apply to the HumanCAD program as well as other
17 anthropometric programs?

18 A. The error rates and ranges based on our experience with
19 using a number of them is that they are all comparable.

20 Q. Okay. And do you have another slide regarding the
21 accuracy?

22 A. Yes.

23 MR. PACKIN: I'll ask to mark that and offer that as
24 P-24, subject to the same conditions and limitations.

25 (Plaintiff's Exhibit-24 marked for identification)

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1 MR. WALSH: No objection.

2 THE COURT: P-24 in evidence.

3 (Plaintiff's Exhibit-24 admitted into evidence)

4 MR. PACKIN: And that one, for the record, is called
5 "Anthropometric Analyses of Crew Interfaces and Component
6 Accessibility for the International Space Station."

7 BY MR. PACKIN:

8 Q. What does that one depict, sir?

9 A. It simply is another error rate and demonstrates the
10 validity and accuracy of these approaches in something that is
11 as life critical as space transport, the space station, as
12 well as lots and lots of vehicles of all sorts.

13 THE COURT: Just a thought that emerges. These
14 digital models, they do a snapshot in time, right?

15 A. Yes.

16 THE COURT: We're not yet into flow dynamics of
17 human beings moving?

18 A. Correct.

19 THE COURT: Right?

20 A. In what I've shown here?

21 THE COURT: That's right.

22 A. That's correct.

23 THE COURT: In at least the anthropometric modeling
24 systems that you are describing here.

25 A. Yes.

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1 THE COURT: Okay, fine.

2 MR. PACKIN: Thank you.

3 BY MR. PACKIN:

4 Q. The example of the space program, would it be correct that
5 in terms of determining anthropometry and fit of humans within
6 a space vehicle, you can't test that in reality? You can't
7 send them up and then test it, correct?

8 A. Well, you can create a mockup.

9 Q. Right.

10 A. But no, one would want to test it before one sent someone
11 into space to live there for any period of time.

12 Q. Is anthropometry used before that is done or even before
13 mockups such as that are built to determine sizes and shapes
14 and configurations?

15 A. Oh, yes.

16 Q. And did you -- and so I take it from these peer reviewed
17 articles that the technology of the HumanCAD program has been
18 tested?

19 A. It has.

20 Q. And it has been accepted, received general acceptance in
21 your scientific community of injury biomechanics and accident
22 reconstruction, is that correct?

23 A. It has.

24 Q. Or have there been error calculations made with regard to
25 the anthropometry program such as this?

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1 A. Yes. They are published in the literature. They're
2 certainly acceptable, realizing that we have -- we're not
3 perfectly rigid and there are situations where our soft
4 tissues come into contact, but these error rates are within a
5 range of a few percent, depending on whether you're talking
6 about reach or balance.

7 Q. Are there standards in existence controlling the
8 application of HumanCAD program to a given scenario?

9 A. Again, having made no attempt to be complete in looking at
10 these standards, I simply picked one. There is the
11 International Standard ISO9241 entitled "The Ergonomics of
12 Human System Interaction." That is the responsibility of the
13 ISO Technical Committee 159, and one of the subcommittees,
14 Subcommittee 3, of that standards group is entitled
15 "Anthropometry and Biomechanics."

16 Q. What does ISO stand for?

17 A. International Standards Organization.

18 Q. Is that a recognized standards making body?

19 A. It is. A whole series of bodies.

20 Q. I'm sorry?

21 A. A whole series of bodies.

22 THE COURT: Subcommittee is entitled --

23 A. Anthropometry and Biomechanics. It's Subcommittee 3.

24 BY MR. PACKIN:

25 Q. Did you prepare a slide depicting now the interface

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1 between your photogrammetric analysis and your anthropometric
2 analysis?

3 A. Other than the Figure 3 we're talking about?

4 Q. The one that showed -- you have a slide that shows
5 photogrammetry on one side and anthropometry on the other.
6 Can you put that up?

7 A. Oh, sorry.

8 MR. PACKIN: There you go. I would ask that we mark
9 that as P-25, subject to the same criteria.

10 (Plaintiff's Exhibit-25 marked for identification)

11 THE COURT: Oh, okay. A slide showing comparison of
12 photogrammetry and anthropometry as --

13 (Plaintiff's Exhibit-25 admitted into evidence)

14 A. Anthropometry.

15 THE COURT: Yes, right. Thank you. As used in the
16 Hayes expert report in this case, right?

17 A. Yes.

18 BY MR. PACKIN:

19 Q. I would actually -- I think it's more the progression than
20 a comparison. Would it be fair to say, Doctor, that on the
21 left you've represented the data you took from photogrammetric
22 analysis?

23 A. Of the scene, yes.

24 Q. And then to the right we see that used together with the
25 anthropometric, correct?

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1 A. Yes.

2 Q. When the photogrammetry and the anthropometry revealed the
3 image that's shown in the upper right corner of P-25, which is
4 also represented as Figure 3 in your report, did you test it
5 against your own evaluation as an injury biomechanics expert
6 and as an engineer as to whether it, in fact, as represented
7 by these programs, was a fair and realistic representation?

8 A. I did, yes. I asked the question fundamentally, "Does
9 this produce the injuries from this position?" From my
10 understanding of the physics of reactive forces on rotating
11 saws, my understanding of human anatomy and these analyses of
12 the scene, I reached a conclusion and an opinion on the
13 fundamental question of "Could he fit?"

14 Q. All right. And based on the photogrammetry, the
15 anthropometry and the application of your education, training
16 and experience did you reach the conclusion that Figure 3 was
17 a fair -- Figure 3 was the best representation, or close to
18 it, of his positioning as it would have been just prior to the
19 incident which would have produced the injury signature that
20 we see and allowed him to make the cut?

21 A. Yes --

22 MR. WALSH: Objection, Your Honor. Again, that's
23 not the question the witness was asked to do. He just
24 testified to the question that he was asked, which was to see
25 if he could fit.

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1 THE COURT: No, I think Question #1 in the expert
2 report is a multi-part question. "Was there sufficient space
3 between the two pipes such that Plaintiff could position
4 himself between them, be properly balanced, and complete the
5 second cut in a biomechanically safe manner?"

6 MR. WALSH: That's correct, and that's a very
7 different question from, "Is this the position you believe he
8 was in just at the moment of the accident?"

9 THE COURT: Well, I --

10 MR. WALSH: That's not the question asked. The
11 question asked of the witness is, "Can you fit him in and give
12 us a way of saying that he could have been balanced and
13 completed the cut?" There's nothing there about timing or
14 whether this was the position immediately prior to the cut or
15 anything else. That's not in that question. That's not the
16 question that's answered. It's not the question the witness
17 answered on his deposition.

18 THE COURT: I'm sorry, I lost you. Let me hear your
19 question, Mr. Packin.

20 BY MR. PACKIN:

21 Q. Did you reach the opinion to a reasonable degree of injury
22 biomechanical and engineering certainty that the position as
23 shown in Figure 3 is the position that -- rather -- withdrawn.
24 Based upon the photogrammetric and anthropometric tools that
25 you used as you've described them, and applying your

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1 engineering and injury biomechanics education, experience, and
2 expertise, did you reach an opinion to a reasonable degree of
3 engineering biomechanical -- injury biomechanical and
4 engineering certainty as to whether there was sufficient space
5 between the two pipes such that Mr. McGee could position
6 himself between them, be properly balanced, and complete the
7 second cut in a biomechanically safe manner?

8 A. I did.

9 Q. And is Figure 3 the result -- does Figure 3 represent that
10 opinion?

11 A. Yes, it represents that opinion that, yes, he could fit,
12 be properly balanced, and be set and steady in that position.

13 Q. Did you reach an opinion as to whether that positioning
14 was capable of producing the injury signature that we see in
15 this case?

16 A. It did produce the --

17 MR. WALSH: Objection. That, again, is outside the
18 scope of the report.

19 MR. PACKIN: It's all over his deposition, Your
20 Honor.

21 THE COURT: Mr. Walsh, your objection I do not agree
22 with because we just dealt with the first question pretty
23 much. And the next question is, "Does the evidence in this
24 case support a scenario with Mr. McGee losing his balance,
25 falling to the ground, and then being struck in the face by

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1 the machine while on the ground?" The necessary predicate of
2 deciding whether it happened the way described in the police
3 report is to try to figure out how it did happen.

4 MR. WALSH: Or as the case law holds, doing a
5 differential diagnosis and eliminating other possibilities,
6 which has not been done. And there's been no attempt to
7 eliminate alternative possibilities of this accident
8 happening. And that's -- one of the issues we have here is in
9 a report in a Federal Court a witness, as Your Honor well
10 knows, a witness is required to produce his opinions and
11 everything he relies upon for those opinions. There is no
12 discussion in this report of the nature we've had today
13 anywhere close to it. The witness is expanding his testimony
14 well beyond the three questions that were asked and the
15 answers that he gave in the report, and even as expanded to an
16 extent in the deposition. We're well beyond any point where
17 this witness is answering the questions could he fit. Is
18 there anything supporting? What he talks about in his report
19 and what he talks about in his deposition is, well, nobody
20 said, no eyewitness said he fell other than the policemen
21 reporting it. And, you know, I don't see any loose ground
22 here. And he's got a scar that runs in a particular way, but
23 we don't have any of the medicine at all discussed in the
24 report except for the summaries of a couple of people,
25 treating physicians, as part of the basic facts. But when we

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1 get to the analysis section, which is really the opinions,
2 really the opinion is none of that's here.

3 THE COURT: Well, in his deposition he testified, "I
4 think that second cut as described by Mr. McGee probably
5 happened the way Mr. McGee said on the down stroke, and then
6 the blade was coming up in the kerf, maybe slightly not as far
7 into the kerf as when the cut was made, and that's when the
8 kickback happened, and that's consistent with the injuries
9 that we see," and he explained it in his deposition. Mr.
10 Packin, am I missing something?

11 MR. PACKIN: Your Honor is right on target.

12 THE COURT: He says that in his deposition.

13 MR. PACKIN: This was covered in the deposition. It
14 was the natural corollary of point #2. He said in his
15 deposition that the injury pattern is inconsistent with
16 falling and being struck by the saw and totally consistent
17 with what happened here. What Counsel is presenting is
18 argument that I think is inconsistent with the record and also
19 espousing a standard that I haven't heard of before, and that
20 is that the expert has to eliminate every other possibility
21 and configuration, which could include some quite bizarre
22 ones.

23 THE COURT: Mr. Walsh, I just don't see it the way
24 you do. Differential diagnosis is used for doctors who are
25 trying to diagnose patients where they have to look at

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1 clinical data and eliminate enough diseases so that they can
2 zero in on what the problem probably is. This is a
3 biomechanical report seeking to determine the parameters and
4 the physics of what resulted in this accident, and I see it as
5 a biometric analysis.

6 MR. WALSH: Well, I'll just leave the Court with
7 this one thought. Has there been -- have you heard a single
8 word today, single word, about this witness having any
9 knowledge what a saw wound to the face with a 14-inch carbide-
10 tipped saw blade would look like from multiple other sources?
11 Has there been a single piece of testimony that the witness
12 has even a passing familiarity with what those wounds would
13 look like?

14 THE COURT: Well, this is a Daubert Hearing, and all
15 I'm ruling right now is that the testimony that's being
16 offered here is, I believe, consistent with and not extended
17 beyond his expert report, coupled with his supplemental expert
18 report and what was elicited mostly by you in the deposition.

19 MR. WALSH: I didn't take the deposition but I --

20 THE COURT: Your colleague.

21 MR. WALSH: -- but I read it, and with all due
22 respect, Your Honor, we did not elicit medical testimony in
23 the deposition because there was no cause to do that based on
24 the report that we were given.

25 MR. PACKIN: That issue, by the way, has --

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1 THE COURT: Well, and the other thing is that you
2 did not elicit testimony concerning his rebuttal of your
3 experts, and that was on purpose, but that didn't mean that
4 Mr. Packin could not elicit such testimony at a hearing like
5 this, even in Federal Court which is, I'm very well aware,
6 where we're at.

7 MR. PACKIN: And my position would be also that the
8 other argue about whether he's ever seen a cut-off saw's 14-
9 inch blade injury to somebody's face is totally irrelevant to
10 the analysis he's done here. In part because there's no
11 dispute that this injury came from an individual using a Stihl
12 TS 400 cut-off saw with a 14-inch carbide-tipped 24 tooth oval
13 blade. So there's no dispute over that issue. He didn't
14 incidentally get these lacerations in some other fashion.

15 THE COURT: Please go on.

16 BY MR. PACKIN:

17 Q. Dr. Hayes, you did conclude in your report that while
18 making the second cut, the one that was being made at the time
19 the incident was initiated, Mr. McGee needed to squat down
20 further than he demonstrated at his deposition, is that
21 correct?

22 A. Yes.

23 Q. Did you reach any conclusions as to why there was that
24 difference between his demonstration at his deposition and
25 your biomechanical reconstruction of his position?

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1 A. Because I believe that the demonstration that was elicited
2 from him in his deposition was fundamentally and fatally
3 flawed for a couple of reasons. First, I don't believe it was
4 positioned correctly above the ground in terms of the
5 photogrammetric measurements, the single pipe that was
6 provided. And secondly, the problem was incorrectly bounded
7 by the absence of the second pipe, the pipe behind him, the
8 higher pipe. He wasn't afforded an opportunity to put himself
9 in the same environment that he was at the scene.

10 Q. Were there any other issues that you considered as to what
11 accounted for that difference?

12 A. As I recall, the deposition did not include a blade on the
13 saw, if I remember correctly. I'm trying to think if there
14 are other issues. Those are the two that I think were most
15 important and obvious to me.

16 Q. Was there anything about the trauma sustained in itself
17 that would bear upon your conclusion?

18 A. Yes. It is my experience, having seen literally hundreds,
19 if not thousands, of cases in which testimony is elicited from
20 involved parties or eyewitnesses in which the event is
21 sufficiently traumatic that their recall of the event is
22 imperfect. And I believe his traumatized situation and what
23 has happened to him subsequently likely impaired his recall.

24 Q. Was there any material difference between the positioning
25 that he showed and what you were able to reconstruct?

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1 A. Define material.

2 Q. Significant in terms of the outcome. It's an awkward
3 question, I'll withdraw it. You concluded that the weight of
4 the saw which was being held to his right side had a tendency
5 to shift his body weight to his right. On what did you base
6 that conclusion?

7 A. That's simple -- the most simple of physics. If I hold
8 something close to the center of gravity of my body, hug it to
9 my chest, that simply increases my weight but doesn't change
10 my balance. If I take that same weight and hold it out to my
11 far right side, that tends to shift the center of gravity of
12 my body and the weight outside and tends to decrease balance.

13 Q. And did that tendency to shift his body weight to the
14 right affect in any way either positively or negatively his
15 stability while making the second cut?

16 A. It had a tendency, and of course we weren't there, and he
17 couldn't recall about his left leg and its contact with the
18 front pipe. But the use of the saw to his right would tend to
19 pull his left leg from the lower pipe he was cutting and would
20 tend to be resisted by his hip and potentially his arm contact
21 with the higher --

22 THE COURT: Pull left leg toward where? I've heard
23 this it just -- it's hard for me to capture.

24 A. So if you look at --

25 THE COURT: Had a tendency to pull his left leg

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1 toward --

2 A. Away from the front pipe towards the saw and tended to
3 move him in a direction that would be back into the pipe
4 behind him.

5 BY MR. PACKIN:

6 Q. And how, if at all, would that affect stability, in your
7 opinion?

8 A. Gives you additional stability from the contact behind
9 him.

10 Q. Now, you were asked a second question in this case and
11 that was, as you recited before --

12 THE COURT: The contact being that rear pipe?

13 A. Yes. It's a little like leaning against a wall.

14 THE COURT: Yes, sure.

15 BY MR. PACKIN:

16 Q. You were asked a second question which you read into the
17 record before, "Does the evidence in this case support a
18 scenario with Mr. McGee losing his balance, falling to the
19 ground, and then being struck in the face by the cut-off
20 machine while on the ground as indicated in the Falls Township
21 Police incident report?" Did you reach a conclusion to a
22 reasonable degree of engineering -- I'm sorry, injury
23 biomechanical and engineering certainty as to that question?

24 A. I did.

25 Q. What was your conclusion as to that question?

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1 A. My conclusion as to that question was based in part on the
2 absolute uniformity from eyewitnesses or peripheral vision
3 witnesses that nothing of the sort happened. That version of
4 the event was also directly contradicted by the Plaintiff
5 himself who said that isn't what happened. And secondly, it
6 strains credibility to imagine that this saw, if he fell, was
7 carried with him in such a way that it could produce these
8 injuries and not produce any other injuries to his body.

9 Q. Could -- strike that. Could it have produced the injuries
10 in those two different directions from falling with the saw?

11 A. At that point we're talking about a relatively random
12 event. We can't know precisely beyond what we can know from
13 his positioning and the actual injuries, which is a relatively
14 short distance. If he were to fall in some way, the only
15 falling we hear is towards the back, although we also hear
16 that at some point he went into the ditch itself before he was
17 stopped and constrained, restrained in some way.

18 THE COURT: The ditch was over forward of the cut
19 pipe?

20 A. It was forward of the cut pipe, and there is some
21 testimony indicating he went into the ditch and came out of it
22 again. There is contradictory testimony about whether he fell
23 back over the pipe behind him. I think the event became
24 fairly chaotic after this injury occurred.

25 BY MR. PACKIN:

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1 Q. You wrote in your report on page 7 in paragraph 17 that
2 the pattern of injuries to the right side of his face and neck
3 were consistent with the body position shown in Figure 3 and
4 not with falling to the ground and then being struck by the
5 cut-off machine in the face. What about the pattern of
6 injuries was not consistent with falling to the ground and
7 then being struck?

8 A. That it would hit him in precisely that position would
9 produce the second cut, which we can explain in the other
10 scenario. We have no idea the path of the saw as he was -- as
11 he would have been falling if he fell. I think it becomes
12 speculative and completely contradictory to what I believe is
13 compelling unanimity of the eyewitness testimony and his own.

14 Q. You also wrote in that paragraph that the witnesses who
15 testified did not document or establish that -- they said they
16 did not feel any softness, looseness, or instability in the
17 ground and nothing slippery. Did that in any way play a part
18 in your conclusion?

19 A. Well, to the extent that is going to be argued that he
20 slipped or that it was uncertain footing or that he couldn't
21 have been balanced and the slip caused this injury, Mr.
22 Caldwell, in his deposition, basically contradicted that
23 notion. Mr. Rivera also said there was no problem with the
24 footing. And we know that heavy equipment was -- had its
25 tracks running over this region. I didn't see from

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1 photographs any substantial evidence of wetness in the region
2 where this occurred.

3 Q. And have you prepared a slide showing the pattern of
4 injuries versus the positioning in connection with Question 2?

5 A. Well, it mostly is a summary of the eyewitness testimony.
6 Is that the slide you mean, loss of balance?

7 Q. The one that shows Figure 3 and Mr. McGee's face.

8 A. Oh, sure.

9 Q. The one you just passed.

10 A. I know.

11 MR. PACKIN: I'd offer that as P-26, subject to the
12 same limitations.

13 (Plaintiff's Exhibit-26 marked for identification)

14 MR. WALSH: No objection.

15 THE COURT: Thank you. P-26 in evidence.

16 (Plaintiff's Exhibit-26 admitted into evidence)

17 BY MR. PACKIN:

18 Q. And then you made a chart. I think that you just showed
19 us the criteria you used in addressing and answering Question
20 2 as well, in addition to that.

21 A. Sorry.

22 MR. PACKIN: I would offer that as P-27. Those are
23 corroborating criteria in addition to the pattern of injury.

24 (Plaintiff's Exhibit-27 marked for identification)

25 THE COURT: Is that a fair summary of some of that

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1 corroboration, as counsel calls it?

2 A. It is, Your Honor, with citations to deposition testimony
3 by the involved witnesses.

4 THE COURT: Okay, so that's P-27?

5 MR. PACKIN: Yes, Ma'am.

6 THE COURT: Any objection, Counsel?

7 MR. WALSH: I guess there's no objection, Your
8 Honor. I mean, these are little teeny excerpts --

9 THE COURT: Sure.

10 MR. WALSH: -- taken out of very, very lengthy
11 depositions, and what they're worth is what they're worth, I
12 suppose.

13 THE COURT: Thank you. P-27 in evidence.

14 (Plaintiff's Exhibit-27 admitted into evidence)

15 BY MR. PACKIN:

16 Q. And you were asked to address a third question which you
17 read to us before, "Could the accident have been prevented by
18 supporting the pipe with a strap configuration attached to a
19 crane or forklift?" Did you reach an opinion to a reasonable
20 degree of engineering biomechanic -- I keep saying that. I'm
21 sorry. Withdrawn. Did you reach an opinion to a reasonable
22 degree of injury biomechanical certainty and engineering
23 certainty as to whether -- as to that question?

24 A. I did.

25 Q. What was your opinion, sir?

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1 A. I believe that a strap used in anticipation -- I believe a
2 strap could not have been used to prevent this accident
3 because a strap -- well, that's what I concluded is that a
4 strap would not have helped, in all likelihood would have made
5 it worse.

6 Q. And on what did you base that conclusion?

7 A. I based that conclusion on my understanding of the run of
8 this pipe, generally a curved run coming from around the
9 spoils pile and descending into the trench. So it was a pipe
10 that was in fact bent to --

11 THE COURT: Now, this is both pipes, right?

12 A. Both pipes, yes. This is both pipes.

13 THE COURT: Actually both pipes.

14 A. Curve around the spoils pile and come into the ditch.
15 That means that that pipe is subjected to bending, in addition
16 to a small amount of sagging. The strap will help with the
17 sagging and the response to gravity, gravitation, but it can't
18 deal with the sideways bending. That's the consequence of it
19 curving.

20 THE COURT: So it's exposed to sagging, right?

21 A. A little bit.

22 THE COURT: When you say exposed to sagging --

23 A. It is --

24 THE COURT: -- it's going to experience that, right?

25 A. It did experience sagging because gravity works on any

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1 object between -- this was supported on the spoils pile away
2 from the trench and on the edge of the trench.

3 THE COURT: Right.

4 A. Gravity will tend to cause that to bow down a small
5 amount. More importantly, this pipe was bent around the
6 corner, and the strap won't help you with that.

7 THE COURT: Around the corner into the trench.

8 A. Around the spoils pile and into the trench.

9 THE COURT: Around the spoils pile and into the
10 trench. So it's bent and bent. It's in a long curve?

11 A. It's bent like this if I come around the curve. And by
12 this, I'm taking my thumbs and pressing on one side and
13 creating that bending curvature. And we have direct evidence
14 that that was, in fact, so because we see a small buckling of
15 the pipe.

16 THE COURT: You got ahead of me. It's bent around
17 the spoils pile and into the trench causing what kind of
18 tension? Sideway? What kind of pressure?

19 A. It causes on --

20 THE COURT: You talked about sagging.

21 A. Yeah.

22 THE COURT: So what is this bending doing?

23 A. This bending, if you could imagine, if I can -- let's see,
24 let me grab --

25 THE COURT: Just what's the word?

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1 A. It is called --

2 THE COURT: It's a sideways type of tension?

3 A. It is tension on the inside of the pipe where Mr. McGee is
4 positioned, and it's compression on the other side before it's
5 cut.

6 BY MR. PACKIN:

7 Q. Do you have a picture showing that, a slide showing that?

8 MR. PACKIN: We'll offer this as P-28, subject to
9 the same limitations.

10 (Plaintiff's Exhibit-28 marked for identification)

11 MR. WALSH: No objection.

12 THE COURT: Thank you. In evidence.

13 (Plaintiff's Exhibit-28 admitted into evidence)

14 BY MR. PACKIN:

15 Q. And will you explain to us in that lower left image what
16 you're -- the compression tension issue?

17 A. Yes. And this shows the compression and tension after the
18 cut is made. But here is the pipe behind him coming around
19 the spoils pile and down into the trench. So it's supported
20 between here and here. Here's the pipe of interest coming
21 around, bent around the spoils pile down into the trench. And
22 before it was cut, because it's on the outside of the curve,
23 that means --

24 THE COURT: The cut is on the outside of the curve?

25 A. Well, even before the cut, as it's coming around the curve

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1 before it's cut, the side where Mr. McGee was positioned
2 before he started to do either cut was in tension on the
3 inside and compression on the outside just because it's bent
4 the way we see it.

5 THE COURT: I lost you there.

6 A. Okay.

7 THE COURT: Okay, we're looking at the bottom photo
8 on the slide.

9 A. On the left.

10 THE COURT: Which is a different view of these two
11 pipes than we've been using up until now.

12 A. No, it's the same view.

13 THE COURT: Oh, okay, it's just closer up.

14 A. Yes.

15 THE COURT: And so the cut, I call it the cut pipe,
16 is still on the right.

17 A. It is.

18 THE COURT: Yes. And the second pipe is on the
19 left. And the basic curve of both pipes goes from, as you
20 say, around the spoils pile where the pipes are coming from.

21 A. Yes.

22 THE COURT: And downward toward the edge of the
23 trench, and then the pipes go into the trench.

24 A. They do.

25 THE COURT: And obviously the first cut was on the

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1 exterior side of the pipe on the right.

2 A. Yes.

3 THE COURT: And the photo we're looking at is after
4 that exterior cut has been made.

5 A. Yes.

6 THE COURT: Yes.

7 A. And after the --

8 THE COURT: And after the second cut has been made -
9 -

10 A. Part, yes.

11 THE COURT: -- as well.

12 A. Yes.

13 THE COURT: And there's kind of a little snaking
14 effect right at that location.

15 A. You call that buckling. There has been -- that's a
16 release of the internal stresses there, sometimes in this case
17 have been referred to as residual stresses. They're internal
18 stresses that are created that are then released and produce
19 the figure you see there with the open kerf on the tension
20 side and the closed kerf on the compression side.

21 THE COURT: Okay, and those are the terms that you
22 use for the outer side of the curve and the inner side of the
23 curve. Outer side would be tension and the inner side would
24 be compression.

25 A. Yes, exactly.

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1 THE COURT: You see, I would have thought the outer
2 side you would call it like the stretch part and the inner
3 would be the compressed part, but the outer part you're
4 calling --

5 A. We're talking about two points in time. You are actually
6 right. The curvature of that pipe before it's cut at all has
7 tension on what is now the compression side. And I'm sorry
8 that that's so confusing because it's a different point in
9 time. But before this pipe is cut it has tension between the
10 two pipes and compression on the outside of the cut pipe. And
11 now after those two cuts are made, that reverses. We get that
12 little notch, that little buckle, and now we have tension
13 opening. We used to call this, when we were talking about
14 treating bones, bending open or bending closed, and that's
15 exactly the situation that we see here. And the point is that
16 the strap helps you to the extent that sagging is important.
17 The strap does nothing to help you with all this bending and
18 redistribution of stresses.

19 BY MR. PACKIN:

20 Q. Dr. Hayes, if I understand correctly, then, there were
21 stresses in two directions, vertically from gravity causing
22 sag --

23 A. Yes.

24 Q. -- and horizontally from tension and compression because
25 of the bending in the way the pipe was laid down, correct?

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1 A. Yes, and I believe the latter are much higher stresses.

2 Q. Thank you. Now, you indicate in paragraph 18 of your
3 report that the only way to prevent a pinch from occurring at
4 some point in this cut would not be by suspending the pipe
5 from a strap but by positively securing the pipe by some
6 mechanisms on both sides of the cut so the pipe could not move
7 as the cut was being made. On what do you base that
8 conclusion?

9 A. My understanding of these stresses and how they relate to
10 the physics of both bending and gravitational sagging. So in
11 order to prevent any kind of motion of either fragment, either
12 half of this pipe where the cut is made, you have to
13 positively resist both sagging tendency and the bending
14 tendency. You have to lock both of those out. And then you
15 can have a kerf that won't even move at all.

16 Q. Was it -- in your -- you reached a conclusion --

17 THE COURT: To fix the tension? To balance the
18 tension?

19 A. Yes.

20 THE COURT: To balance the stresses or to eliminate
21 the stresses?

22 A. To eliminate the tendency for that pipe to move and create
23 the bending open kerf and the bending closed kerf, which is a
24 sideways effect, not an up and down effect.

25 BY MR. PACKIN:

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1 Q. You rendered an opinion that it would not have been
2 practical or possible to secure the pipe in that way in the
3 field, is that true? That was your opinion?

4 A. I can see no way to do it without creating some sort of an
5 enormous vice that would allow you to lock it down in all
6 directions such that you could cut it without any motion of
7 either end of the cut surface.

8 THE COURT: Have you seen such a machine?

9 A. I never have.

10 BY MR. PACKIN:

11 Q. You indicate in that same paragraph in your report that
12 you believe that the kickback was caused by a combination of
13 the pipe bowing with some small amount of sagging and the
14 aggressive tooth blade. If the bowing would not have --

15 THE COURT: What page are you on, Counsel?

16 MR. PACKIN: Page 8, the last part of paragraph 18.

17 THE COURT: Just a second, please. Counsel, I'm
18 sorry, but I'm being distracted by the work that you're doing
19 at counsel table, even though you're very quiet. If you would
20 like to, you know, do it, we'll give you a spot.

21 MR. RUDOLPH: Sorry about that, Your Honor.

22 THE COURT: Thank you. Okay, we're on page 8.

23 MR. PACKIN: The last half of paragraph 18, about
24 four lines down it says, "The kickback in this case was
25 caused" --

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1 THE COURT: "Was caused by," okay.

2 BY MR. PACKIN:

3 Q. Would the supporting of the strap have prevented the
4 kickback under such a scenario?

5 A. No, I believe not.

6 Q. And what was your reasoning as -- strike that, strike it.
7 Before we get to that --

8 MR. WALSH: Your Honor, may I have an inquiry again
9 as to what we're doing time-wise here because --

10 THE COURT: Sure.

11 MR. PACKIN: I'm just about at the end.

12 MR. WALSH: -- we've been going for hours. There's
13 -- is this witness going to be available tomorrow?

14 MR. PACKIN: Probably, and we're only back, save for
15 the interruptions, about an hour since lunchtime. We started
16 at 1:30, we're at 10 of 3. We had a few colloquy but other
17 than that, as I said --

18 THE COURT: I think that's not Mr. Walsh's concern.
19 It's just how to plan his time. Is Dr. Hayes available
20 tomorrow? Because obviously we can't get through a cross
21 examination now that it's 10 of 3 --

22 MR. PACKIN: Probably.

23 THE COURT: -- despite best efforts.

24 MR. PACKIN: Can I have a moment to talk to him?

25 THE COURT: Sure. Why don't you take 5 anyway.

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1 (Court in recess)

2 THE COURT: Okay, back on the record.

3 DIRECT EXAMINATION (CONT'D)

4 BY MR. PACKIN:

5 Q. Referring, Dr. Hayes, to P-28 that's up on the screen,
6 what is being shown in the right side of that image, the
7 graphic?

8 A. That a strap can be used to address the issue of sagging
9 or help with the issue of stabilization against gravity but --

10 THE COURT: It's the same as -- okay, sagging and
11 stable. So if you push on it, that's another thing.

12 A. Its weight pushes on itself --

13 THE COURT: Right.

14 A. -- down towards the ground. And I could hold that up the
15 way we hold the board when we're cutting it so that we won't
16 get a pinching or a kickback. But the strap, since it is free
17 to swing, doesn't apply a positive restraint for the bending
18 part of this, which I believe is the more important of the
19 environmental influences that influence this event.

20 BY MR. PACKIN:

21 Q. Do you have another slide showing the gentleman, showing
22 the same image that's on the top left, I believe, and the two
23 runs of pipe? Can you put that next to light up?

24 MR. PACKIN: Can we mark that as P-29, subject to
25 the same limitations? And Your Honor, in P-5 that's #37.

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1 It's got the second yellow tab on it.

2 (Plaintiff's Exhibit-29 marked for identification)

3 BY MR. PACKIN:

4 Q. What is being shown in that --

5 THE COURT: Are you offering --

6 MR. PACKIN: Yes, Ma'am.

7 THE COURT: Where are we? P-29?

8 MR. PACKIN: P-29.

9 THE COURT: Slide. Any objection?

10 MR. WALSH: No objection, Your Honor.

11 THE COURT: Okay, thank you. In evidence.

12 (Plaintiff's Exhibit-29 admitted into evidence)

13 BY MR. PACKIN:

14 Q. What is being depicted in that slide?

15 A. We are seeing a situation where an eyewitness to this
16 event, a Mr. Caldwell, who after the event was over, after Mr.
17 McGee had made those first two cuts and after removing one of
18 the pipes, completed a cut across the remaining two to four-
19 inch ligament or so that was testified about, and successfully
20 cut the pipe that Mr. -- completed the cut that Mr. McGee had
21 started. And it shows that a crane and a strap is being used
22 around the pipe. Remember at this point that buckling process
23 that occurred has released those internal tensions and largely
24 released the bending stresses such that in this configuration,
25 the pipe is -- the sagging of the pipe is helped. But that

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1 certainly wouldn't be the case for the first situation.

2 THE COURT: For the first two cuts?

3 A. For the first two cuts.

4 THE COURT: Is that what you're saying?

5 A. Yes, it is.

6 BY MR. PACKIN:

7 Q. Now, the photograph that you had on one of your very first
8 slides showing the open kerf and the closed kerf, if you could
9 go back to that? That's P-8, for the record.

10 (Plaintiff's Exhibit-8 previously marked for
11 identification)

12 THE COURT: Just a second.

13 MR. PACKIN: There we go.

14 THE COURT: Counsel, I'm not with you yet.

15 MR. PACKIN: P-8 was the slide that's --

16 THE COURT: Sure. Are we at P-8?

17 MR. PACKIN: Yes, Ma'am.

18 THE COURT: Okay, fine. Go ahead.

19 MR. PACKIN: And I'm referring to the image on the
20 right which is photograph #36 contained within P-5.
21 It's P-5(36).

22 BY MR. PACKIN:

23 Q. You told us before, Dr. Hayes, that that's a photograph
24 representing what the pipe that Mr. McGee had been attempting
25 to cut looked like after his accident, correct?

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1 A. Yes.

2 Q. And you've labeled the outer side "first cut open kerf"
3 and the inner side "second cut closed kerf"?

4 A. Yes.

5 Q. Do those represent the effect of that bowing or lateral
6 movement or lateral stress that was on the pipe as
7 differentiated from the gravity or sagging?

8 A. It does, as long as we understand it is after the initial
9 bending has been released, creating a bending open situation
10 on the first cut and a bending closed situation on the second.

11 Q. And you wrote in your report that the kickback was caused
12 by a combination of that pinch and the aggressive tooth blade.
13 What role did the aggressive tooth saw blade play in that?

14 A. Based on the advice and warnings provided in the Stihl
15 manual that cutting with a so-called aggressive or tooth
16 blade, one that creates a higher friction between the cut
17 material and the saw blade, can contribute to pinching. It
18 likely contributed at the point where the cutting was
19 occurring. So that's one factor. And secondly, the pinching
20 by the pipe now as we have released those internal stresses
21 and the pipe starts to buckle is moving to the side and
22 causing closure as he comes up towards the end of trying to
23 complete his cut with the second cut.

24 THE COURT: That was a very long sentence.

25 A. My apology.

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1 THE COURT: I'm trying to decipher it.

2 BY MR. PACKIN:

3 Q. Well, initially you said that the teeth increase the
4 chance of pinching. Was that a misspeak?

5 A. It was a misspeak.

6 Q. Okay.

7 A. It increases the chance of kickback or of motion of the
8 saw because of the more aggressive nature of the interaction
9 at the cutting point of the saw.

10 THE COURT: And motion of the saw?

11 A. The motion of the teeth, if you will, of the blade.

12 THE COURT: Sir, I'm not following. The teeth of
13 the saw, the toothed saw --

14 A. Yes.

15 THE COURT: -- increases the chance of kickback as
16 stated in the manual. That is all I've got so far.

17 A. So that's one factor that likely played a role here. A
18 second factor is the release of these internal bending
19 stresses by the process of the first cut and starting to
20 complete the cut with what he called -- we've called the
21 second cut.

22 THE COURT: Let me just get that. Starting to
23 perform second cut, right?

24 A. He's almost done so --

25 THE COURT: Okay. By completing first cut and

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1 working on second cut.

2 A. Yes. Or attempting to complete the second cut.

3 THE COURT: Making second cut.

4 A. Yes.

5 THE COURT: Okay, so that's the release of the
6 internal bending forces.

7 A. Yes.

8 THE COURT: Okay, that's the second factor. And
9 then you were saying, because as you assess it -- and then you
10 were saying how you think that the second cut progressed, the
11 direction of the second cut progressed. I didn't let you
12 finish that.

13 A. Okay. So the direction of the second cut, as Mr. McGee
14 testified, is he did a plunge cut essentially horizontally
15 into the pipe, went down in order to complete the connection
16 to what was the first cut, now started to come up, as you said
17 earlier, and was proceeding up towards completing. He was
18 within that ligament distance of completing the second cut
19 when the kickback occurred.

20 THE COURT: Ligament. Ligament is the space between
21 the two cuts --

22 A. Yes.

23 THE COURT: -- that has not been cut, right?

24 A. It is the remaining material still connecting the two
25 cuts.

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1 THE COURT: And do you have an estimate of how wide
2 that ligament is based upon your review of these records? It
3 doesn't have to be precise. You haven't pixelated it?

4 A. I have not pixelated it. His testimony was 2 to 4 inches.
5 I think on observing this photograph, and that would, just by
6 rough estimation, would comport with our understanding of its
7 10-inch diameter.

8 THE COURT: Because its circumference would be more
9 than 10 inches, would go all the way around.

10 A. I was thinking more if we know the 10-inch diameter and we
11 know we're a little out of plane, that probably fits.

12 THE COURT: Okay, thank you. And so making all
13 these cuts and leaving only a 2 to 4-inch ligament you're
14 saying most of the bending tension in the pipe is being
15 released at that moment. Is that what you're saying?

16 A. That's exactly what I'm saying.

17 MR. PACKIN: Thank you, Your Honor.

18 BY MR. PACKIN:

19 Q. You issued a supplemental report in this case, which we
20 marked, dated January 15, 2010, is that correct?

21 A. Yes.

22 Q. What additional materials did you review in connection
23 with that supplemental report?

24 A. As noted in paragraph 2, since completing my first report,
25 I have reviewed additional materials, including the report of

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1 Harry L. Smith, PhD., MD and the report of Vincent Morabit, M-
2 O-R-A-B-I-T.

3 Q. And what was your understanding as to what role those two
4 individuals play in this case?

5 A. I believe they are experts retained by the Defense in this
6 matter.

7 Q. And what was your understanding as to the purported areas
8 of expertise of those individuals respectively?

9 A. I believe that Mr. Smith is going to testify about
10 mechanism and biomechanics of injury, as best I understand it,
11 and Mr. Morabit as an engineering expert.

12 Q. What was the purpose of --

13 THE COURT: Smith is a doctor, right?

14 A. He is both an --

15 THE COURT: He's listed there as an MD and you think
16 he's testifying about what?

17 A. I believe injury biomechanics.

18 THE COURT: Injury biomechanics. Okay, fine. And
19 then Morabit is an engineer, right?

20 A. Yes.

21 BY MR. PACKIN:

22 Q. What was the purpose of your supplemental report?

23 A. To call attention to what I believe is a flawed
24 understanding on the part of both experts to the physics -- of
25 the physics of the so-called kickback process, as well as to

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1 the flawed nature of Dr. Smith's recreation of the event as is
2 shown in Figure 1 on the left of my supplemental report.

3 Q. And after reading the Smith and Morabit reports, did you
4 reach any conclusions to a reasonable degree of injury
5 biomechanical and engineering certainty regarding the opinions
6 expressed on those issues?

7 A. Did I reach an opinion?

8 Q. Yes, as to the opinions they expressed regarding kickback,
9 which you mentioned, and Dr. Smith's reconstruction.

10 THE COURT: That's kind of a long question. The
11 report is short. Why don't we just look at what his opinions
12 are?

13 BY MR. PACKIN:

14 Q. In paragraph #3 where you conducted your discussion of the
15 Defense expert's report, what is the issue that you addressed
16 there, sir?

17 A. In paragraph 3 I'm talking about the physics of kickback
18 and -- that's your question.

19 Q. Could you explain to us what conclusions you reached
20 regarding the physics of kickback and on what you base those
21 conclusions?

22 A. My conclusions are based on a fundamental understanding of
23 engineering physics, and put simply, Drs. Smith and Morabit
24 assert that the only way that kickback can occur is if there
25 is a pinching or stopping or reactive force applied in the

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1 upper right quadrant of the saw blade as viewed from the side.
2 And so if I imagine a saw blade viewed from the right-hand
3 side of the saw, superimpose a clock face, the upper quadrant
4 goes of course from 12 o'clock noon to 3 in the afternoon.
5 They assert that you can only get kickback if, in fact, it
6 pinches there. I believe that is a flawed understanding
7 because it does not consider anything beyond the reactive
8 force applied to the blade. And if one considers the
9 interaction of the saw with the human being operating the saw,
10 I can show enumerable examples of kickback occurring when the
11 contact with the blade is in the lower right quadrant from 3
12 to 6 o'clock or additional potential positions even.
13 Q. Can you explain how kickback can occur when the saw is not
14 in the upper quadrant only?

15 THE COURT: When the pinch is not only --

16 MR. PACKIN: Right --

17 THE COURT: -- in the upper quadrant.

18 MR. PACKIN: -- I'm sorry.

19 BY MR. PACKIN:

20 Q. When there's a pinch in the lower quadrant.

21 A. Your Honor, if I could draw on the --

22 THE COURT: Sure.

23 A. -- easel there?

24 MR. PACKIN: I think you're going to need the
25 Lavalier microphone.

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1 THE CLERK: You can either use that one and wear it
2 or we can put the hand held one on.

3 A. Whichever is easier.

4 THE CLERK: Whichever is easier.

5 A. Can you hear me? Testing, testing. Maybe I don't have it
6 on.

7 THE CLERK: It's on.

8 A. Now it may be on. Here's our saw, roughly represented
9 with the saw blade to the right. Let's say the guard is
10 roughly like this. I put it on the left-hand side from the 12
11 o'clock noon roughly to the 6 p.m. position. And now let's
12 think about kickback as it is commonly assumed and is being
13 asserted by Dr. Smith and Morabit. If there is a pinching in
14 the 3 to 12 o'clock position, the Stihl manual states and
15 physics would agree that the force that is applied to the
16 overall saw from the pinching -- remember that the saw blade's
17 going like this --

18 THE COURT: It's traveling -- on your picture, it's
19 traveling in a clockwise direction.

20 A. It is traveling in a clockwise direction. And to get an
21 intuitive sense of what this force means, this kickback force
22 that I've shown on the circumference of the saw blade
23 tangential to the edge of the saw blade is the force necessary
24 to stop that blade cold from going roughly 5,000 rpm to
25 something very close to zero rpm if it's a severe kickback.

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1 That's the severity and instantaneous nature of that force
2 that occurs.

3 THE COURT: So if you were a giant and you would not
4 hurt yourself and just touch down with your fingers and pinch
5 as hard as you could that clockwise spinning blade in the
6 upper right quadrant, then the whole machine is going to move?

7 A. Yes. The first point is under these conditions I've only
8 showed the giant pinching and stopping it. And I made some
9 simple physics calculation of these kinds of forces and they
10 can be in the nature of thousands of pounds, big force.
11 That's as far as the discussion of kickback in the Stihl
12 manual gets is that this --

13 THE COURT: Just a minute. That arrow, your
14 tangential arrow up toward noon on the clock of the blade,
15 represents, what do you call it, force?

16 A. It is exactly a force. It's generally referred to in the
17 manual and in the literature physical reactive force --

18 THE COURT: Okay.

19 A. -- that occurs at the periphery. And it's fairly obvious
20 to see that if you don't think about what else is going on
21 with this machine, this would tend -- this force, tangential
22 force, would tend to drive it back up towards the operator's
23 face. That's the --

24 THE COURT: Drive the whole setup.

25 A. Saw.

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1 THE COURT: The whole rig.

2 A. The whole rig back towards the operator's face. And
3 again, if I drew a second arrow where I've got kickback or
4 I've got a reactive force that occurs at the bottom, at 6
5 o'clock, and I put that force on the blade, now I've got my
6 giant pinching at 6 o'clock, it's going to stop it cold, and
7 that's generally referred to in the manual and elsewhere as
8 pull-away. If you think only about the blade and --

9 THE COURT: You know, I don't know anything about
10 physics. I can't absorb it other than as necessary to do this
11 job. When you showed the top pinch, you've got your rotation
12 going in the clockwise direction. When the pinch occurs, the
13 opposite force is exerted, an opposite force, in the
14 counterclockwise and upward direction, right?

15 A. In order to stop the rotation, yes.

16 THE COURT: When you're describing the bottom pinch,
17 yes --

18 A. Same thing.

19 THE COURT: -- they are going opposite.

20 A. Same thing.

21 THE COURT: Your arrows are going opposite there.
22 Okay, that makes sense.

23 A. And then a third example also as I recall shown in the
24 manual is if we get a pinch at 3 o'clock, that's called
25 climbing upward. All of those only consider what happens to

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1 the periphery of the blade. The flaw in that, and this is a
2 flaw that we start trying to drum into engineering students
3 the first week they are in mechanical engineering, is that
4 it's not enough to show the force on only part of the system.
5 You have to show all of the forces on the system. That's
6 called creating a free body diagram. So I can turn this
7 diagram into a more complete representation if I include a
8 force applied by the hand of the operator, a force applied by
9 the hand of the operator, and they can go in either direction,
10 so I'll make -- depending on the situation. And there is a
11 force of gravity acting down. Now --

12 THE COURT: Because this is not a table saw.

13 A. This is not a table saw. This is handheld. It has a
14 weight and you are holding it. The situation that is not
15 being considered is if I have a saw that is pinched in any one
16 of these ways, the force applied by the pinching process goes
17 around one of your hands, causes the saw to go up in,
18 depending, this direction, go out and around in this direction
19 if I hold on here. So I can have a --

20 THE COURT: Referring to the left hand.

21 A. If I hold -- if the saw is pulled out of my right hand,
22 rotates around and up, I can get kickback if kickback is used
23 to define coming up toward and hitting the operator. Under a
24 condition like this, a condition like --

25 THE COURT: A condition like your bottom pinch.

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1 A. A condition like the 6 o'clock pinch or the 3 o'clock
2 pinch. If I have my hand braced against the top handle, it
3 comes out of my other hand, I can with the 6 o'clock, a 3
4 o'clock or virtually any other pinching that occurs on the
5 blade, get what ultimately results in a potentially
6 devastating injury to the operator. That's simple physics use
7 of free body diagram. And so if I have a situation where I'm
8 perhaps using my saw in a roughly vertically oriented
9 position, handle, handle, I've got a hand force of some sort,
10 I've got another hand force, I get a pinch at let's say 6
11 o'clock, my hand stays attached, the saw comes around and can
12 hit me in the face. And so this is a perfect example, I wish
13 I'd used it in teaching, to show that you must consider all
14 the forces on the system, you must consider the interaction
15 between the human and the saw. You can't just rely on where
16 the pinch occurs and its direction.

17 THE COURT: When you say free body diagram, free
18 body refers to the fact that the saw is a free body and human
19 is a free body, or that the whole man and machine, you know,
20 connection is a free body?

21 A. A free body diagram is --

22 THE COURT: Is it one word?

23 A. Free body is generally hyphenated, or sometimes two words,
24 free body diagram would be three words. A free body diagram
25 is defined as removing the object from its environment in a

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1 drawing and replacing that environment by the forces that the
2 environment imposes on the object.

3 THE COURT: And replacing that environment in a
4 diagram by the forces that the object --

5 A. The environment imposes on the object.

6 THE COURT: This is just a sketch, but since it's
7 been drawn this afternoon during the hearing I think we should
8 mark that.

9 MR. PACKIN: I agree.

10 THE COURT: That will be P-30. Is that all right?

11 MR. PACKIN: Yes, Ma'am. Should the witness mark
12 it?

13 THE COURT: Well, we'll put a sticker on it. If you
14 would just lightly write P-30 somewhere so I'll remember.

15 A. What's the number?

16 THE COURT: P-30.

17 A. P-30?

18 THE COURT: And it's at my suggestion. Any
19 objection, Counsel?

20 MR. WALSH: No.

21 THE COURT: Thank you, sir.

22 (Plaintiff's Exhibit-30 marked for identification)

23 A. So I don't think I had finished answering your question --

24 MR. PACKIN: Okay.

25 A. -- which also included, perhaps it didn't, my discussion

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1 of Mr. -- Dr. Smith's recreation.

2 BY MR. PACKIN:

3 Q. Yes, it did, but we divided them out, so now address that,
4 please.

5 A. And so I have placed in Figure 1 on the left Dr. Smith's
6 recreation, the use of the surrogate, and what certainly
7 appears to be a positioning of the two pipes that is at
8 variance from what we found from photogrammetry with one pipe
9 22 inches above the ground at its bottom most surface, and the
10 other 10 inches off the ground or a 12-inch differential. And
11 if we realize that the pipes shown here are expected to be 10
12 inches in diameter, he has what we've called the back pipe far
13 too low to appropriately recreate the scene.

14 Q. Was that the purpose in putting that photograph there?

15 A. Yes.

16 Q. Now, you also indicate in that supplemental report that
17 the potential for a reactive force to cause injury regardless
18 of how or where on a blade it occurs depends on the magnitude
19 of the reactive force itself, as well as how the operator
20 responds to the reactive force. Could you explain what you
21 meant by that opinion and on what you based it?

22 THE COURT: Where are we now? What page?

23 MR. PACKIN: That would start on -- it's on page 2,
24 the top paragraph. It's about five, six lines down. It
25 starts the last three words in the sixth line, "The potential

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1 for."

2 THE COURT: I think he just got done explaining
3 that.

4 BY MR. PACKIN:

5 Q. Was that covered by that answer, sir?

6 A. As long as we are aware that pinching can occur not only
7 at the periphery of the blade, but also interior to that as a
8 bending closed configuration is created as occurred here.

9 Q. Okay. Now, when you're cutting an object such as HDPE
10 pipe, which is not solid, points of the blade that are inside
11 that cut are not in contact with anything on either side, is
12 that correct?

13 A. Yes.

14 Q. And points deeper into the cut or closer to the spindle,
15 so to speak, or the axis of the blade are potentially in
16 contact with the sides of the pipe, correct?

17 A. Yes, as is shown in the same Figure 1 to my supplemental
18 report, Part B, you can see an overlap between the 10-inch
19 pipe and the 14-inch saw blade.

20 Q. So if, for example, as shown in Dr. Smith's photograph,
21 which is figure 1A on page 2 of your report, if a pinch were
22 to occur at that point, the pinch would be interior to
23 potentially the periphery or the outer circumference of the
24 blade, correct?

25 A. That's exactly right. If you think about our top view and

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1 the bending closed or the closing kerf occurring interior to
2 the blade, and you can see from that figure the two
3 contributions, the presumably cutting interaction that's
4 occurring at the periphery of the blade towards the top of the
5 second kerf towards the -- at the ligament junction, as well
6 as the contribution on the interior as this pinching occurs.

7 A. All right. Now --

8 THE COURT: Okay, just a minute. Cutting is
9 happening at like 1 o'clock, right?

10 A. Cutting from my Figure --

11 THE COURT: On the top of the blade.

12 A. -- 1B is likely occurring from that figure around -- well,
13 it's about 11 o'clock on the pipe and about 2 o'clock
14 somewhere, 2 to 3 o'clock on the saw blade.

15 THE COURT: Oh, okay. I know what you mean by 11
16 o'clock on the pipe. Just a second. So that's toward the
17 very -- it is toward the top of the pipe.

18 A. In terms of the figure that, and I don't remember the
19 exhibit, but the figure --

20 THE COURT: It's Figure 3, your Figure 3 in P-3,
21 your report.

22 A. It's there, too?

23 THE COURT: My question is you've got it here as
24 your Figure --

25 A. B.

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1 THE COURT: -- B.

2 A. Yes.

3 THE COURT: And it's the exact same thing that you
4 had in your earlier report.

5 A. Also yes.

6 THE COURT: I'm just trying to, for the record, get
7 the reference you're making. So the cut pipe is being
8 contacted by the blade in this figure at approximately the 11
9 o'clock location on the circumference of the pipe as we look
10 straight at this diagram, right?

11 A. Yes.

12 THE COURT: And then to determine what point on the
13 blade you've got going, the blade is attached to the machine,
14 and you're saying the guard would be basically parallel to the
15 face of the machine itself.

16 A. Yes, the --

17 THE COURT: That's running basically parallel to the
18 right knee of the figure. I'm calling that the face of the
19 machine, the front surface of the machine.

20 A. Okay.

21 THE COURT: So you got the blade is out from there.

22 A. Correct. The guard is shown.

23 THE COURT: Is the guard shown?

24 MR. PACKIN: Yes. If you look, Your Honor, it's
25 parallel to -- it's almost over the front line of the left

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1 shin.

2 THE COURT: Oh, okay. That's the guard right here.
3 And so you're going to get your clock face on the blade by
4 calling the deepest point on the guard --

5 A. I'm going --

6 THE COURT: -- 6 o'clock on the blade? No.

7 A. No. Run a line from the back of the machine, kind of
8 bisect that line at the very back of the saw.

9 THE COURT: Right.

10 A. Run it out through the center of the blade, and that'll
11 give me 3 o'clock roughly.

12 THE COURT: Only if I know where to start on the
13 blade. That's what I'm trying to figure out.

14 A. The arbor of the blade, or the center of the circle that's
15 representing the blade, is hidden behind his leg. But if you
16 just roughly estimate it from top to bottom of the circle of
17 the blade --

18 THE COURT: No, no, you're not understanding. I'm
19 not adequately conveying what my question is. It's a very
20 simple question when we look at your sketch, P-30, because the
21 way you drew the sketch you can say, you know, the bottom
22 curve of a blade is 6 o'clock and it intersects on a
23 perpendicular with the bottom straight edge of the guard.

24 A. And that was only happenstance.

25 THE COURT: Schematic, right. So but what I'm

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1 trying to find out is in what I'm calling your Figure 3, where
2 the high noon position is on the blade so that we can figure
3 out what all the other positions are on the blade.

4 A. So run a line from the back, roughly the back of the saw
5 towards the center of the circle of the blade,

6 THE COURT: Right.

7 A. And that gives me 3 o'clock.

8 MR. PACKIN: Your Honor, if I may?

9 THE COURT: Just a minute. If you run a straight
10 line through the middle of the back of the saw in Figure 3 and
11 through what appears to be the middle of the front of the saw,
12 and then straight on the same line through the blade, and you
13 say that line is at about the 3 o'clock place --

14 A. Yes.

15 THE COURT: -- on the blade? Okay, just a second.
16 So the top of the guard as shown in Figure 3 does not coincide
17 with high noon.

18 A. Correct. It looks more -- and the figures from the scene
19 make it look a little more like 1 o'clock or so.

20 THE COURT: Okay.

21 A. And you can test yourself by looking at the intersection
22 with the most advanced portion of the saw blade and where it
23 intersects with the pipe, 11 o'clock on the pipe. That's just
24 about 3 o'clock on the blade, which was precisely Mr. McGee's
25 testimony as to about where he was cutting when it occurred.

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1 THE COURT: Okay. Thank you. I'll be right with
2 you.

3 (Pause in proceedings)

4 THE COURT: I guess I stopped you when you stated in
5 your testimony before we went into trying to find words to
6 describe what we're looking at in your Figure 3 is I had you
7 down in my notes as saying in Figure 3, the cutting at this
8 moment as described in Figure 3, is happening at approximately
9 1 o'clock on the blade, and I think you're saying it's really
10 3 o'clock on the blade.

11 A. I don't recall saying 1 o'clock if I did, but it looks to
12 me like it's 3 o'clock if you do that drawing, 11 o'clock on
13 the pipe.

14 THE COURT: Okay, okay, thank you.

15 A. And pinching that could occur interior.

16 THE COURT: 3 o'clock on the blade and 11 o'clock on
17 the pipe, and I think you said you saw the potential for
18 pinching at the top of the cut because of the bending, the
19 internal bending compression?

20 A. No.

21 THE COURT: No. At the top of the pipe because
22 you're meeting resistance as you go up? Just because you're
23 cutting.

24 A. If I'm cutting where the saw teeth are, there's a
25 potential for resistance from the fact that it is a toothed

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1 carbide-tipped blade at that point.

2 THE COURT: At the top of the second cut kerf?

3 A. Yes, exactly that point.

4 THE COURT: Okay. So the toothed blade up there has
5 an effect.

6 A. Is actually cutting at that point.

7 THE COURT: Has effect because cutting at top of
8 second kerf. Also what you're saying is internal pinching is
9 happening to the blade where the blade and the saw are
10 overlapping in Figure 3 --

11 A. Where the blade and --

12 THE COURT: -- which is interior of the -- is on the
13 interior of the blade.

14 A. Blade and the pipe are overlapping.

15 THE COURT: Yes, the blade and the pipe.

16 A. Yeah, you said blade and -- blade and the pipe and that's
17 because of the pinching from bending sideways.

18 THE COURT: Just a second. It's clear.

19 MR. PACKIN: Thank you, Your Honor.

20 BY MR. PACKIN:

21 Q. In your Figure 3 --

22 THE COURT: But Mr. Walsh, I'm sorry to say, even
23 though you're ready to go, I think that the bench and maybe
24 even the witness are going to want to knock off when we finish
25 with today's testimony. We'll start as early as you want

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1 tomorrow.

2 BY MR. PACKIN:

3 Q. In your Figure 3, Dr. Hayes, just to go a little further
4 with what the Court had been asking you, in your Figure 3 we
5 see sort of what used to be called a Venn Diagram, the
6 overlapping of the blade circle with the pipe circle, correct?

7 A. Yes.

8 Q. The blade is solid and the pipe is hollow, correct?

9 A. Yes.

10 Q. The portion of the pipe that overlaps onto the blade in
11 that diagram, the outer outline would be in contact
12 theoretically with the blade surface, correct?

13 A. Or certainly close to it.

14 Q. Right. And the portion of the blade that is forward of
15 that would be in, for lack of a better word, free space within
16 the open interior of the pipe, correct?

17 A. Yes.

18 Q. And is it correct that as the blade moves into the pipe
19 those clock face points converge towards the center of the
20 blade? In other words, they're radial, they're not linear,
21 correct?

22 A. I'm not understanding the last part. I thought I --

23 Q. Well, as you move the blade into the cut, the pipe is
24 getting closer to the spindle.

25 A. Yes.

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1 Q. Correct? So it's -- the vector is narrowing, correct?

2 A. I don't know, again, about vector, but the edge of the
3 pipe is getting closer and closer to the spindle. Think of it
4 from the other perspective, plunging in. You're taking it up
5 to the spindle of the saw blade.

6 Q. And were -- are those the opinions you reached in the
7 supplemental report based upon your analysis of the Smith and
8 Morabit reports?

9 A. Yes, those are my opinions, and to the extent that it's in
10 my purview to say anything about reliability, I believe that's
11 flawed analysis and would be flawed and confusing testimony to
12 the jury.

13 Q. Now, and those opinions that you expressed regarding -- in
14 your supplemental report, are they held by you to a reasonable
15 degree of injury biomechanical and engineering certainty?

16 A. Yes.

17 Q. Now, I want to shift gears for a moment. Actually, hold
18 on one second, please. Did you find any support in the Stihl
19 owner's manual for your conclusions regarding kickback in
20 general and kickback in particular when involving a carbide
21 tipped toothed saw blade?

22 A. I find statements in the Stihl manual that certainly are
23 consistent with this science-based analysis in that the Stihl
24 manual, and I quote, says "Reactive forces may occur at any
25 time the cutting wheel on a cut-off machine is rotated." They

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1 further say, "If the wheel is slowed or stopped by frictional
2 contact with any solid object or by a pinch, reactive forces
3 may occur instantly and with great force." They tend to focus
4 -- the manual doesn't use the term, as far as I recall,
5 "kickback." It talks about reactive forces on the blade and
6 thus really doesn't address the issue of whether that reactive
7 force can produce a motion back towards the operator.

8 Q. And does the manual address any issues as to reactive
9 forces in relation to the toothed saw blade?

10 A. It does say in a number of places that more aggressive or
11 toothed saw blades should never be used because they can
12 increase the propensity for reactive forces and cause injury
13 and death. I'm not quoting that well, but that's basically
14 the idea.

15 Q. Now, shifting gears, do you use others in your company to
16 assist you in evaluating cases in general, and did you use
17 them in this case specifically?

18 A. Yes and yes.

19 Q. Now, who did you use to assist you in the evaluation in
20 this case?

21 A. People who worked under my direction, supervision, and
22 control. In my evaluation of the case, there are other people
23 involved that I'll mention very briefly, but I had three
24 professionals. The first is Erik, that's E-R-I-K, Power who
25 has a Master's in Mechanical Engineering and Injury

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1 Biomechanics and is working under me on his Ph.D. in Injury
2 Biomechanics. Secondly, I used Dr. Bauer that I've spoken
3 about before. And thirdly, I used a registered nurse by the
4 name of Gina, with a G, Carter, who's been with us for 15
5 years, I guess, or 12, 14 years, to do first summaries of the
6 medical records.

7 Q. And you mentioned there were some non-professional or --
8 strike that -- non-evaluating personnel that you used?

9 A. Yes, and if I can, in two or three sentences, describe the
10 process?

11 Q. Yes.

12 A. Materials come in, let's say it is a deposition. If it's
13 a deposition of a treating physician, that's reviewed first by
14 the nurse. It is highlighted. A summary is created from that
15 set of highlights. I then go over the summary, along with the
16 deposition itself at my side. If there are areas of further
17 inquiry that I believe need to be explored in that deposition
18 as I look at the deposition itself, I note that, sticky note
19 it, and we get further information in that area. If it is a
20 deposition, let's say, of an engineering expert, same process
21 is followed by -- in highlighting reports, highlighting
22 deposition testimony. I look at the raw record, the raw
23 report. I then look for more highlighting if it's not there
24 or I put it in myself.

25 Q. Who does it if it's an engineering deposition or report?

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1 THE COURT: Does what?

2 BY MR. PACKIN:

3 Q. Who does that highlighting?

4 A. Erik Power or Jeremy Bauer or one of the professional
5 engineering associates that are in my firm. That highlighted
6 material, let's say it's a deposition, is then transcribed by
7 a production staff who create a case summary with citations to
8 the text changing the question and answer format of a
9 deposition to simple declarative sentences with citations. We
10 call that a case summary, and it is what I use to study and
11 prepare for a deposition or a trial testimony. So it is not
12 that I have deposition summaries that are my only contact with
13 the materials. I've looked through the medical records, I've
14 looked through those depositions, I have read the reports of
15 opposing experts as part of our standard operating procedures.

16 Q. Now, what functions generally did Erik Power -- you said
17 he has a Master's in Mechanical Engineering and Injury
18 Biomechanics, correct?

19 A. Yes.

20 Q. And he's currently a PhD. candidate?

21 A. He is.

22 Q. In what field?

23 A. Injury biomechanics. Mechanical engineering at Oregon
24 State under the biomechanics rubric of that department.

25 Q. And what functions did Mr. Power serve in the process that

1 was used in this case?

2 A. He did this reviewing process. We meet at the outset.
3 When we understand some of the facts of the case, we jointly
4 plan strategy and analysis approaches we will take,
5 technologies we will use. We meet constantly along the way.
6 He's a particularly demanding associate in terms of
7 interaction, and he's the person who sits at the computer
8 terminal implementing HumanCAD, for instance. He may do
9 physics calculations, again under my direction, supervision,
10 and control and interaction throughout. He often drafts first
11 drafts of parts of reports. The nurse does the same for the
12 medical record summaries, et cetera.

13 Q. And did the nurse perform that function in this case?

14 A. She did, again with my oversight and interaction.

15 Q. And did you receive the case summary as to the medical
16 issues and the medical documents themselves?

17 A. Yes.

18 Q. And the same with the depositions? Did you receive a case
19 summary as to each deposition and the depositions themselves?

20 A. Yes, and I have those highlighted records here with me
21 today.

22 Q. And Jeremy Bauer, what role did he play in this case?

23 You've already told us what he did I believe was some
24 photogrammetry, correct?

25 A. He did the photogrammetry analysis that was done here. He

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1 also performed -- he did some background review on the
2 accepted use of photogrammetry in a wide variety of issues.
3 Mr. Power did the same thing with the anthropometry methods we
4 used.

5 Q. Now, did you discuss and/or meet with these individuals as
6 this process was going on to direct or supervise their work?

7 A. I did on a frequent, at least weekly basis.

8 Q. Why do you use that process -- strike that. Was that
9 unique to this case or is that the process you follow in your
10 office in working up and performing the evaluation of a case?

11 A. That's a process that we uniformly use in all of our cases
12 under a set of standard operating -- explicit standard
13 operating procedures, or SOPs, that control the tracking of
14 all of these documents, the analytical work, to make sure we
15 meet the case deadline.

16 Q. Now, when you say explicit processes, are there any
17 protocols, written protocols, in place in your office for this
18 procedure and this process?

19 A. Yes.

20 Q. When individuals come to your office, are they trained in
21 that process, that protocol?

22 A. Yes.

23 Q. How many years did you say that Gina Carter has been with
24 you?

25 A. I think it's probably now 13 now. '98. Yeah, something

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1 like that, 13 years.

2 Q. And has her ability to follow those protocols been -- have
3 you had an opportunity to observe her ability to follow those
4 protocols?

5 A. Yes, on literally hundreds, if not thousands, of cases,
6 yes.

7 Q. And has she done so appropriately?

8 A. Yes.

9 Q. How about Erik Power? How long has he worked in your
10 company?

11 A. Eight or nine years approximately.

12 Q. And does he follow those protocols as well?

13 A. They do. He does, yes.

14 Q. Jeremy Bauer, same?

15 A. Yes.

16 Q. How long has Jeremy Bauer been associated with Hayes and
17 Associates?

18 A. Almost as long as Gina Carter.

19 Q. And how many total employees does your company have?

20 A. I think it's 21 at the moment.

21 Q. Now, why do you use the process of having these other
22 professionals do some of that initial work and outlining and
23 highlighting for you, and then that -- followed by that
24 collaborative process?

25 A. It is, I believe, the most cost-effective, most accurate

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1 process. It also tracks the same kind of processes I used
2 with graduate and undergraduate students in my academic
3 positions at Stanford, Harvard and University of Pennsylvania.
4 I have always worked that way with others in a collaborative,
5 interactive, checks-and-balances sort of way.

6 Q. How long have you employed that type of process in your
7 work -- in your consulting work?

8 A. I've done it as long as I have been doing this kind of
9 work. I think the first time I was ever deposed was in 1978.
10 I have always had assistants. I have always worked with
11 someone under my direction.

12 Q. When you have the collaborative discussions with these
13 individuals, either in person or by phone, or how -- by
14 whatever means of communication, do they provide you with
15 input and feedback as well, as part of the collaborative
16 process?

17 A. Of course.

18 Q. Now, in this case, did you check the work that -- and the
19 processes that these individuals followed in this case?

20 A. Yes.

21 Q. Do you do that in every case?

22 A. I do.

23 Q. Were you satisfied that their work had been properly
24 performed and that the information and materials that were
25 presented to you were presented to you properly?

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1 A. Yes. To the best of my ability, yes.

2 Q. Who was responsible for reaching the ultimate conclusions
3 in this case?

4 A. I am.

5 Q. And you are the signatory on the report of November 3,
6 2009, correct?

7 A. I have signed both of my reports and list Erik Power as
8 the primary responsible associate also on both of those
9 reports.

10 Q. Now, Erik Power has signed both reports, correct?

11 A. He has.

12 Q. And why did you do that, sir? Why did you have him do
13 that?

14 A. I always have. I think it important to give credit where
15 credit is due. He makes a significant contribution to this
16 work and it's a way to recognize him.

17 Q. Okay. The conclusions, though, although it's signed by
18 Erik Power, the conclusions are yours?

19 A. Yes, and I'm the one responsible for testifying about
20 them.

21 THE COURT: Do you ever bring Mr. Power to testify?

22 A. I have never been in a situation where I had an
23 opportunity to bring him. He does, in fact, testify. He is
24 increasingly getting his own, independent --

25 THE COURT: He's building. Right? A practice?

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1 A. He's building a practice and testifies on his own, and I
2 do everything I can to encourage clients to retain these
3 people independently of me.

4 BY MR. PACKIN:

5 Q. When you were doing your work in the medical field, in
6 Harvard Medical School and other places, did you go into
7 operating rooms with surgeons?

8 A. I did.

9 Q. Did you observe residents doing portions of surgery?

10 A. I did.

11 Q. Is that a common practice as well, that kind of
12 collaborative effort during a surgery?

13 A. Yes.

14 Q. I'd like to shift gears again. You've seen, I take it,
15 the papers that have been filed here on the Daubert Motion by
16 the Stihl Defendants?

17 A. Yes.

18 Q. I'd like to ask you some questions arising under those
19 papers. Now, you do not own a gasoline-powered, hand-held
20 power saw, correct?

21 A. I do not.

22 Q. You've never used one to cut anything?

23 A. Not that I can recall.

24 Q. Did that, in any way, bear upon your ability to reach the
25 conclusions that you've reached in this case on the questions

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1 that were presented to you?

2 MR. WALSH: Your Honor, I've got to object. This is
3 an absurd line of questioning, asking the witness of things he
4 doesn't know and hasn't done, whether that somehow, would have
5 affected his ability to give an opinion. I mean that's an
6 inherently foolish question.

7 MR. PACKIN: Well, the only thing that might --

8 THE COURT: Just a minute.

9 MR. PACKIN: -- be absurd and foolish is that
10 objection. Clearly, somebody who has a expertise and a
11 scientific background, knows what information is and is not
12 necessary to conduct their analysis. If that were -- and
13 these are points taken --

14 THE COURT: I'm listening.

15 MR. PACKIN: -- directly from their papers,
16 certainly if the doctor -- Doctor Hayes would be the person in
17 the best position to tell us whether he needed to own or
18 operate a cut-off saw to reach the conclusions he reached in
19 this case. It was part of our argument here, Your Honor, as
20 set forth in our papers is, they set up this whole laundry
21 list of completely irrelevant and useless issues relating to
22 what this witness did, because he was not offered as a design
23 expert. He was not offered as the product defect. He wasn't
24 offered as the warning defect. He was offered in, on some
25 very focused issues. So, there are probably thousands of more

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1 things that they could have listed in their motion papers,
2 that he didn't familiarize himself with for the reason that
3 they were not necessary. Now, they've raised the issue and
4 I've got a right to address the issue. This is our Daubert
5 Hearing.

6 MR. WALSH: Your Honor, He's asking the witness,
7 effectively, to opine on what is a matter of law. That what
8 is relevant to the witness' preparation and background is not
9 for the witness to say. The law specifies what the witness is
10 required to do or not required to do. The witness can't
11 possibly, I mean if every witness would come in here,
12 obviously, and say, "Oh, I didn't need to do anything."

13 THE COURT: Okay. The Judge will determine what is
14 necessary to support an admissible body of expert opinion.
15 However, I cannot exclude, at this Daubert Hearing,
16 Plaintiff's counsel to have the opportunity to explore the
17 very questions that are briefed against admissibility of this
18 opinion testimony. And also, to have their opportunity to
19 inquire of the witness about the very questions that were
20 asked on these topics, at his deposition, by defense counsel.
21 The rule is that the procedure should be defense counsel,
22 whoever is there to depose the witness gets to explore
23 whatever questions they want in discovery, but the offering
24 party does not have to, and generally, doesn't even have the
25 opportunity to go back around and ask their questions about

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1 those lines of questioning. By deposition, page 44:
2 "Have you ever used a gasoline-powered, handheld cut-off
3 machine? Have you ever purchased a gasoline-powered, cut-off
4 --" and it goes on for pages. I don't need to hear a great
5 deal about this but, nor am I going to sustain that objection.

6 MR. PACKIN: Thank you, Your Honor.

7 BY MR. PACKIN:

8 Q. As an engineer, and as somebody who does injury bio-
9 mechanics, did you need to own or have operated a gasoline-
10 powered, handheld cut-off saw to reach the conclusion or
11 evaluate the issues you evaluated in this case?

12 A. I believe I did not because they were peripheral to the
13 central methodologies that I employed, which required knowing
14 the weight of the object, knowing its physical dimensions,
15 understanding the physics of both a rotating saw and the rest
16 of the saw, and understanding the stresses associated with a
17 bent and cut piece of pipe.

18 Q. Did you have pictures of the actual accident saw?

19 A. I had pictures of the saw as well as its dimensions.

20 Q. And in the Stout matter, I believe you testified you
21 actually saw one and picked one up, is that correct?

22 A. I did.

23 Q. Having done so in the Stout case, did that lead you to
24 reach any conclusion that you needed to own one or operate one
25 to make an evaluation and render opinions in the McGee case?

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1 A. It did not, in terms of the scientific basis for my
2 opinions.

3 Q. It is stated that you have never adjusted the guard on a
4 cut-ff saw or removed or installed the cutting attachment. Is
5 that correct?

6 A. Yes.

7 Q. Did you need to, in your opinion from -- you've been
8 conducting the evaluation in this case, did you need to do
9 either of those things to evaluate the issues in this case and
10 reach your conclusions?

11 A. I -- No. I did not. I had a picture of the saw that gave
12 me, and testimony about lack of anyone moving the guard on the
13 saw, to reliably base my opinions on the guard position,
14 roughly, and the rest of the information was quite
15 straightforward, in terms of its weight, its external
16 dimensions, and I didn't need to go beyond that to
17 understanding whether it's two-cycle or four-cycle or the
18 details of -- I have read the manuals, immediately forgot most
19 of the instructions in terms of how to move the guard and how
20 to reattach a blade.

21 Q. All those operational -- all that operational, all of that
22 operational information was in the manual? Is that correct?

23 A. There, there was -- I don't know about all, but there was
24 certainly a lot of operational information that I simply found
25 not on point, and wasn't cost-effective or time-effective to

1 address the questions I was asked.

2 Q. So you were aware of those issues, and determined that
3 they weren't necessary to?

4 A. I did. I was.

5 Q. It has been indicated that you have no experience working
6 in construction. Is that accurate?

7 A. Well, I think the rest of my answer at my deposition was
8 that I spent summers working construction and I certainly did
9 that. I put my time in.

10 Q. It's indicated in the papers that you didn't obtain any
11 HDPE (High-Density Polyethylene) pipe for the purpose of your
12 analysis in this case. Is that true?

13 A. That is true.

14 Q. Why is that, sir?

15 A. Because I believed I had reliable methodology. Sometimes,
16 it's, as we saw in at least some instances, can be more
17 reliable than a recreation with physical objects.

18 Q. You had photographs of the pipe?

19 A. I did.

20 Q. Did you understand what HDPE material was?

21 A. I work on a kind of polyethylene that's called high-
22 density polyethylene. I work on what's called ultra-high-
23 molecular-weight polyethylene and I have over the course of my
24 career, since that kind of material, referring to the pipes,
25 has been tried in orthopaedic implants, I'm aware of some of

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1 its limitations in that setting and its properties when used
2 in others.

3 Q. Did you understand what the geometry and dimensions of
4 this HDPE pipe were, from the materials you had?

5 A. Yes.

6 Q. Okay.

7 THE COURT: Did you know the interior diameter of
8 this pipe, sir?

9 A. I didn't, as far as I can recall. I was focusing on the
10 external diameter.

11 BY MR. PACKIN:

12 Q. It's indicated in the papers that you've never seen HDPE
13 pipe that has been cut, other than in the photographs in this
14 case. Is that true?

15 A. I think that's true, at least as far as I know.

16 Q. And did you feel you needed to see HDPE pipe that had been
17 cut by some means in order to make your evaluation in this
18 case?

19 A. No.

20 Q. Why is that, sir?

21 A. It wouldn't have added anything material or substantial to
22 the bases for my opinions. I mean if we're interested in
23 whether he can fit in a certain space, we need to define the
24 external geometries of that space and relate it to his body.
25 I wasn't attempting to calculate the reactive forces, to

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1 determine the numbers associated with pinching forces or with
2 the aggressivity of the blade. If I had been focused on that
3 kind of issue, it would have been more important to know the
4 internal dimensions.

5 Q. And why were you not focused on those kinds of issues?
6 Why were they not germane to what you were doing in this case?

7 A. Because, in fact, those weren't the questions I was asked,
8 nor do we have sufficient information. With all of the input
9 variables that would be necessary to actually calculate the
10 pinching forces that -- it wasn't worth the time. As long as
11 we understand the physics correctly, it wasn't worth the time.

12 Q. It is indicated you never actually saw the TS 400 that was
13 involved in this accident or the blade that was on it. Is
14 that correct --?

15 A. It is.

16 Q. -- in terms of seeing them in person.

17 A. It is. The blade was destroyed, I believe, that same day,
18 as far as I know, or thrown away. The saw, again, I didn't
19 need any additional information.

20 Q. Okay. It is indicated you are not a design engineer and
21 have never designed a cut-off saw or any of its components.
22 Are those statements correct?

23 A. The second of those statements is certainly true. I have
24 never designed a cut-off saw. I have, in fact, designed small
25 gasoline-powered tools, as I recall at General Motors Research

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1 Laboratory, and it's not correct that I'm not a design
2 engineer. In fact, I have a master's degree in mechanical
3 engineering design from Stanford, and have designed things
4 over the course of my career.

5 Q. It is indicated that you don't know whether the TS 400 has
6 a two- or four-stroke engine, what type of drive mechanism it
7 uses, how its cylinder is ported, whether the fuel tank is
8 vented or un-vented, and a number of other, similar issues.
9 Did you need to know in order to, from an injury bio-mechanics
10 and engineering standpoint, did you need to know any of that
11 information in order to address the issues you addressed in
12 this case?

13 A. I don't believe so.

14 Q. Why is that?

15 A. Again, they weren't germane to my analysis.

16 Q. Would the fact -- would the nature of the drive mechanism
17 change any of the evaluative process?

18 A. Not that I can see.

19 Q. It is indicated that you have not participated in any
20 standards-making organizations relations related to design or
21 safety of cut-off saws or other handheld power equipment. Is
22 that correct?

23 A. Yes.

24 Q. Did that have any -- does that have any bearing on your
25 ability to perform the biomechanical and engineering

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1 evaluations you've performed in this case?

2 A. I don't believe it's material. I don't believe that
3 qualification is necessary to perform the work that I did
4 here.

5 Q. You -- it's indicated you didn't review the standards
6 governing design and use of cut-off saws. Is that correct?

7 A. Well, I certainly reviewed them. In the Stout matter, had
8 reviewed them within six months or something like that, prior
9 to being deposed in this proceedings. And having read those
10 standards, and I did look at them again recently, they weren't
11 informative about the aspects of this case that I was asked to
12 address.

13 Q. It is indicated you haven't authored anything regarding
14 the design, use, or safety of a cut-off saw. Is that correct?
15 Other than the reports in this case, and in Stout.

16 A. I thought of a correction to the previous answer, if I
17 could and I --

18 Q. Sure.

19 A. -- missed your last question. I believe that those
20 standards, as they are promulgated in Australia, and I'm
21 forgetting exactly where else, there are some descriptions of
22 procedures that have been used to investigate kickback and
23 I've looked at those, thought about them, and they were as
24 background informative for me, but not sufficiently reflective
25 of a situation where the saw is handheld and there's an

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1 interaction between a human being and the saw. So I'm aware
2 of those from those standards, or that line of information,
3 but didn't employ it.

4 Q. It's indicated that you have not authored anything
5 regarding design, use, or safety of a cut-off saw. Is that
6 correct?

7 A. Yes.

8 Q. -- other than the reports in Stout and McGee.

9 A. That's true.

10 Q. Did the -- did that, in any way, impair your ability to
11 conduct the engineering and biomechanical analysis in this
12 case?

13 A. I don't believe so.

14 Q. Why not, sir?

15 A. Not on point.

16 Q. It's indicated in the papers that you, yourself, spent
17 only 5.6 hours working on this case prior to writing your main
18 report and .6 hours drafting and editing the main report,
19 based upon your time records. Is that accurate?

20 A. As I recall, we had a relatively short timeline for
21 producing our report. That does not sound, for that stage of
22 an analysis, very much out of line. Those 5.6 hours are
23 spent, in part, with review of materials, I think under the
24 heading of "Case Summary." There are also a series of case
25 conferences that reflect interaction with my staff.

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1 Q. It's indicated that your associate drafted most of the
2 main report. Is that accurate?

3 A. I don't know what we mean by "most" or how, exactly, that
4 question was asked, if it was, at my deposition. That
5 typically, Gina Carter would do the medical synopsis as well
6 as the case summary timeline. And they are charged, yes, with
7 first drafts of much of that report.

8 Q. And then you bring to bear your expertise upon that
9 collaborative process?

10 A. Edit and rewrite and that sort of activity.

11 Q. It's indicated that you did not read any of the deposition
12 transcripts from cover-to-cover, including Mr. McGee's. Is
13 that accurate?

14 A. I believe it's fair to say that I haven't read them cover-
15 to-cover. If there is a long question and answer session on
16 something that is totally irrelevant to my opinions,
17 background information for the case, I page through it until I
18 get to a section that there is, again, something relevant that
19 has been flagged by staff.

20 Q. Would things such as Mr. McGee's employment history or
21 educational history be of relevance to you?

22 A. Not in this case. In an ergonomics case, for instance,
23 that was about cumulative trauma over a lifetime, that's
24 important, but in this case, no.

25 Q. Would the employment or educational history of Mr. Rivera

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1 or Mr. Caldwell or Mr. Kuhn, or any of the other witnesses be
2 of any significance to you in this case?

3 A. No.

4 Q. Would the depositions of witnesses who never used a cut-
5 off saw and didn't witness this accident be of any use to you
6 in the evaluation you made in this case?

7 A. Not that I can think of.

8 Q. It is indicated that you did not visit the accident site
9 in this case. Why is that, sir?

10 A. My understanding was they were trying to get the pipe in
11 the ground, buried, fused, and that the trench was refilled,
12 presumably that there would be nothing to see or anything of
13 relevance to the scene as it was when this occurred left on
14 that scene. So it made no sense to go there.

15 Q. Was it your understanding that the pipes that had been
16 worked on, pipe that had been worked on by Mr. McGee had been
17 cut, fused, and buried underground?

18 A. That was my understanding, yes.

19 Q. That the trench had been filled and the landfill was being
20 used?

21 MR. WALSH: I think Im going to object to the
22 leading. We're totally leading now, as opposed to just asking
23 questions.

24 THE COURT: We're almost done, I would think.

25 MR. PACKIN: Yes.

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1 BY MR. PACKIN:

2 Q. It's indicated that you did not evaluate, and I'm going to
3 quote this from the papers because I'm not sure I understand
4 it. "The difference" -- what the difference in injury would
5 be between contact with the saw blade resulting from kickback
6 versus incidental contact." Do you understand what that
7 criticism means? That's my first question. Do you understand
8 what "incidental contact" means?

9 A. Well, I can tell you how I took it.

10 Q. Yes.

11 A. I'm going to imagine that the kickback scenario that, I
12 believe is accurately described by Mr. McGee himself, could be
13 distinguished from a situation where he slowly pulled the saw
14 out of the -- under his own power, without a kickback process
15 occurring and it superficially sliced his face. I don't think
16 it's accurate, however, to say I didn't compare the two. Or I
17 certainly have compared the two, reading that kind of a
18 criticism, in that we have evidence of a high-energy event
19 that went deep into the face, and if it's something where he's
20 lifting the machine towards his face, he has time to avoid,
21 create an avoidance maneuver and it wouldn't create the high-
22 energy, comminuted fractures that we actually see, and the
23 second set of injuries that we also have seen.

24 Q. It is indicated that neither you nor anyone at your
25 company has performed any physical experimentation or testing

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1 with cut-off saws to observe kickback or other reactive
2 forces. Is that correct?

3 A. That is true.

4 Q. Why was that not done, sir?

5 A. Because I believe the standards that are used, that look
6 at the issue of kickback related to what's happening to the
7 blade are only part of the picture. And to set up a safe,
8 experimental situation that would, in fact, involve a live
9 human that could recreate this would never be allowed by any
10 human subjects committee, because of the dangers associated.

11 Q. If such an experiment --

12 THE COURT: Even if you use a paper plate instead of
13 a drill saw, drill wheel?

14 A. Yes. I'd be scared having any piece of rotating, anything
15 rotating. And that's why I believe, in fact, if we've got an
16 accurate and reliable methodology that's done in the computer,
17 and it's used in so many situations in the design world and
18 humans interacting with inanimate objects and engineered and
19 designed objects that that is the most reliable way to go.

20 BY MR. PACKIN:

21 Q. And addressing that issue, seriously, the -- in measuring
22 or attempting to measure or evaluate reactive forces, there's
23 a difference between a paper plate and a steel blade, a 14-
24 inch blade and a 7-inch blade, correct? In terms of mass and
25 its --

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1 A. Its mass is different. Most importantly, its rotational
2 inertia is different, if you think of a spinning speed skater
3 changing her rotational inertia by changing the geometry and
4 the position of parts of the body, yes, that's an important
5 part.

6 Q. If a safe and ethical, in terms of the subjects involved,
7 experiment could be set up to test and observe reactive
8 forces, would that type of testing inform you, in any way, as
9 to the specific events that happened in this case, and
10 particularly, the issues you had to address in this case?

11 A. Well, it wouldn't -- it certainly would not be needed in
12 order to support my opinions and analyses in this case. This
13 case was not, for me, focused on calculating those forces or
14 relating the forces of the rotating saw to his injuries. We
15 don't have a way to do that. What we needed to do was line
16 them up and show that when a kickback occurred, as he
17 described it, it put his face in the position that would
18 create these injuries.

19 Q. And why do we not have the ability to do that?

20 A. Because we have -- if you think of a counter-example, we
21 know a lot about the tolerance limits of the skull, when you
22 drop a baby on the floor or when you, when a football player
23 gets hit in the head, to create a concussion. We know about
24 the injury thresholds for the neck because of motor vehicle
25 interaction. We have no tolerance criteria for rotating,

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1 carbide-toothed saw blades going through someone's face.

2 Q. There is criticism set forth that there were no
3 calculations made of the forces Mr. McGee was exerting on the
4 machine at the time of the incident or any resistance provided
5 by him or the deceleration rate of the blade. Were any of
6 those calculations that you needed to do to address the issues
7 you've reached in this case?

8 A. I believe not.

9 Q. Were some of those -- were any of those possible to do?

10 A. I believe the assumptions are so broad and so many to
11 actually, reliably calculate those beyond understanding the
12 general physics and directions of motion, that it would not
13 have added materially.

14 Q. It's been indicated that you cannot say what portion of
15 the blade was pinched in the cut. Is that an accurate
16 statement?

17 A. I believe we can make a reliable estimate of where they
18 occurred, both based on testimony and direction of the
19 resulting motion of the saw and the blade, but the combination
20 or the relative weight, if you will, of pinching from the
21 closing kerf, from the bending of the pipe, and the aggressive
22 nature of the toothed, carbide-tipped saw blade, we can't
23 apportion or parse out. Similarly, we can't say how much of
24 this is coming from the, what we talked about earlier, the
25 part of the pipe that is interior to the edge of the blade and

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1 how much is coming from the cutting surface. Both, certainly,
2 contributed.

3 Q. The -- it's indicated that you don't know the rotational
4 speed of the blade or the energy in the saw at the moment the
5 incident was initiated. Is that correct?

6 A. I haven't tried to calculate it. I am aware of the
7 testimony that nobody knows exactly what, whether it was being
8 operated at highest speed. I know they typically operate it
9 at highest speed, but in terms of actually basing any
10 testimony on it being at that speed, I wouldn't want to do it.

11 Q. Did you need to do it to reach your conclusions?

12 A. I did not.

13 Q. Did you know what the maximum rotational, or spindle
14 speed, was for this tool?

15 A. It -- I'm not going to pick it off of the top of my head.
16 It's in the range of 5,000 rpm. I can tell you the spindle,
17 maximum spindle speed is 5,350 rpm.

18 Q. It's been stated in the defense papers that the HumanCAD
19 program you used has no protocol for measuring reactive forces
20 with a cut-off saw to determine positions it would have been
21 physically possible for Mr. McGee to have been in when the
22 accident occurred. And that, I'm taking verbatim from their
23 papers. Do you understand that criticism? And how do you
24 respond to it?

25 A. It has no protocol for that and these kinds of general

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1 purpose software tools aren't designed specifically for each
2 and every potential application. They are designed for a
3 broad range of situations in which -- and remember, we're
4 addressing the question of "Could he fit and be balanced?"
5 That's what they're designed to do, whether his holding in his
6 hand a 22-plus-pound object that is a saw is a piece of
7 luggage, is it anything -- is it a tool that -- of some other
8 sort, is all represented by its effect on the hands and how
9 much force are on the hands.

10 Q. The papers also indicate that the HumanCAD program is not,
11 "validated for use with cut-off machine accidents." Do you
12 know what that means? Are these programs validated for use
13 with particular types of accidents?

14 A. They are not. They are validated in terms of their
15 ability to represent fit, balance, reach, much more general
16 purpose, objectives, broader questions than that.

17 Q. It's stated that you did not set up a surrogate study or
18 demonstration of how the accident occurred using the cut-off
19 saw and HDPE pipe. Is that correct?

20 A. Yes.

21 Q. Why did you not do that?

22 A. Because I believe there are inaccuracies that invariably
23 creep into these attempts to do recreations and that this was
24 a more reliable approach.

25 Q. Were there any factors that occurred in the field, in this

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1 case, that couldn't be reproduced in a surrogate study?

2 A. For instance, we have no idea as to the slope or pitch of
3 these pipes from the spoils pile down to the trench, that
4 angle. That's, and no one could recall in terms of testimony.
5 We weren't in a position to recreate that. So that's a kind
6 of example. We can't recreate, at least, in most
7 circumstances, the potential for increased security due to the
8 fact that we have a dirt environment. That can cut both ways,
9 of course, but it also can be used to brace oneself, if you
10 will.

11 Q. To conduct an accurate surrogate study, would you need a
12 trench, a spoils pile, a several-hundred-feet-long run of
13 pipe, the same ground surface, all that, those kind of
14 variables, to get it accurate?

15 A. I'm not sure under those circumstances if you could
16 precisely recreate that, even doing all of that.

17 Q. Okay. Is the -- are the computer software programs that
18 you used, basing them from the actual, accident scene
19 pictures, able to do that with a reasonable degree of
20 accuracy?

21 A. Yes. I believe so.

22 Q. Is that -- that's as testified to you -- by you earlier
23 today, correct?

24 A. Yes.

25 Q. It's stated in the papers that the data inputted by you

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1 into the HumanCAD program was limited to the pipe dimensions,
2 blade dimensions, guard geometry and Mr. McGee's height and
3 weight. Is that accurate?

4 A. Yes.

5 Q. Was that sufficient information to yield the result that
6 you showed us here in the Courtroom?

7 A. I believe so, yes.

8 Q. It's stated in the papers that you testified that Figure
9 Three was not meant to be "perfectly accurate." Is that
10 correct?

11 A. Yes. These are meant to be representative, to capture the
12 major important aspects of, to address the questions I've been
13 asked to address. Whether he has toes pointed, whether he has
14 a -- ankle turned outward by forty degrees as opposed to ten
15 degrees, those are incidental findings.

16 Q. And lastly, it's stated in the papers that your conclusion
17 regarding his, Mr. McGee's positioning at the time of the
18 accident is, "simply one of a constellation of alternative
19 positions he could have been in." Is that an accurate
20 statement?

21 A. I believe when I was asked a question like that at my
22 deposition, I stated that I have not looked at a constellation
23 of many other positions. Let's take a ridiculous example of
24 him standing on one leg and reaching, you know, ways that this
25 possibly could have been done. I did not do that. I

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1 believed, on the basis of the testimony, on the basis of the
2 injuries and the physics of the saw and what we see as
3 objective evidence on the pipe, that I have reasonably,
4 reliably recreated the best fit for all of that information,
5 and used that to base my opinions. And so testified, I
6 believe, several times in my deposition.

7 Q. And here, today, as well, you believe, to a reasonable
8 degree of engineering and biomechanical certainty and
9 engineering certainty, that what you showed in Figure 3 is the
10 most likely position that Mr. McGee was in at the time this
11 incident occurred. Is that correct?

12 MR. WALSH: Objection, Your Honor. Again, we're
13 back to the -- Mr. Packin changing the question. The witness
14 has testified about 10 times during this little soliloquy that
15 he was asked to make him fit between the pipes and not, and he
16 didn't, and now, he's being asked if he has a position on the
17 position he was in when the accident occurred.

18 MR. PACKIN: That's just --

19 THE COURT: I understand. I understand the
20 testimony. It's been explored in deposition. It's set forth
21 in the report --

22 MR. PACKIN: Okay.

23 THE COURT: -- we don't have to pursue this further.

24 MR. PACKIN: And just to address, this is about the
25 fourth time he said he was told to just make him fit, and

1 that's just a bogus statement.

2 THE COURT: That's not how it's understood by the
3 Court.

4 MR. PACKIN: Thank you. I have no further
5 questions.

6 THE COURT: All right. Are we ready to recess for
7 the evening?

8 MR. PACKIN: I am.

9 THE COURT: Time is 20 of 5. You have the services
10 of the hall tomorrow. What time would you like to start?

11 MR. WALSH: Your Honor, because, hopefully tomorrow
12 will be a travel day home, if we could start at 9, it would be
13 good to --

14 THE COURT: 9 o'clock.

15 MR. WALSH: 9 o'clock. Thank you.

16 THE COURT: Thank you.

17 (Court adjourned)

18

19 CERTIFICATION

20 I certify that the foregoing is a correct transcript from the
21 electronic sound recording of the proceedings in the above-
22 entitled matter.

23

24 S/Lewis Parham

8/7/12

25

26 _____
Signature of Transcriber

Date